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Environmental Science & Engineering, Inc.



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**DRAFT EXPANDED SITE INVESTIGATION REPORT
CD LANDFILL
Naval Air Station
Norfolk, Virginia**

Prepared for:

Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia

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EXECUTIVE SUMMARY

An expanded Site Investigation (SI) was performed at the CD Landfill to determine the environmental impacts the facility may have imposed on the soils and groundwater. The expanded SI is being conducted by Environmental Science & Engineering, Inc. (ESE) under contract No. N62470-90-D-7661 for the United States Navy, Atlantic Division, Naval Facilities Engineering Commands (LANTNAVFACENGCOM).

Site History

CD Landfill is located on the east side of Hampton Boulevard, 1.5 mile south of the Taussig Boulevard intersection. The study site was purchased in 1974 for construction debris and inert solids disposal; asbestos was also deposited there. Landfill operations began in 1974 and ended in 1987. The sandblasting grit was analyzed in 1981, classified as hazardous waste, and no longer deposited in the landfill. During 1979, a 5-acre area was operated under a permit (No. 286) from the Virginia Department of Health (DOH) to allow disposal of construction and inert solids excluding fly ash, incinerator residues, chemicals, and asbestos. The Navy ceased waste disposal at the facility on 15 June 1987, and has been pursuing final closure since then.

Since 1982, two investigations (Initial Assessment Study (IAS) and Confirmation Study) were performed at the site to evaluate the existence of contaminants that may impact the health and safety of the environment. The only parameter analyzed in the sediment and surface waters was cadmium.

Site Condition

Several Naval support facilities such as Naval warehouses, pass offices, tour offices, and air strip, etc. are located within a 1-mile radius of the vegetated landfill. A small private residential neighborhood (Glenwood Park) and Naval housing are also located nearby. According to available records, the study site was used only for landfilling operations between 1974 and 1987.

Site Investigation

Expanded SI activities began in February 1990 and continued through June 1991. The investigation included subsurface soil, sediment, surface water, and groundwater investigations.

Subsurface soil and sediment samples were collected in Round 1 of the two-event sampling program. Twelve subsurface soil samples were collected and analyzed from the six soil borings (MW-1 through MW-6) at two intervals, 0-2 feet and approximately 7-9 feet. In addition, soil samples were collected every 5 feet (to 25 feet) for soil descriptions. Five sediment samples were also collected in separate locations from the existing drainage ditch. Both media were analyzed for lead, iron, cadmium, pH, total organic halogens (TOX), and moisture.

Six shallow (25-foot) groundwater monitor wells (MW-1 through MW-6) were installed in the same locations as the soil borings. Groundwater samples were collected during both rounds of the sampling program. Five surface water samples were collected in the drainage ditch during both sampling events. Five of the originally planned 10 samples were not collected because the recommended location was dry. Both media (groundwater and surface water) were analyzed for cadmium, and groundwater indicator and quality parameters. The indicator parameters are total organic halogens (TOX), total organic carbon (TOC), pH, and specific conductivity. The quality parameters are lead, iron, sodium, and hardness.

Geologic and Hydrogeologic Assessment Results

The CD Landfill is located within the Atlantic Coastal Plain Physiographic Province. Two major geologic formations underlie the site. The uppermost Columbia Group is characterized by gravels, sands, silts, and clays with some shell fragments; it is heterogeneous and varies in thickness between 20 and 50 feet. The underlying Yorktown Formation is characterized by gravels and thick shell beds and ranges in thickness from 300 to 400 feet. The Yorktown was not encountered at the study area. A confining layer

is thought to exist between the two formations. Although a clay unit was encountered at approximate 23 feet during the field investigation, it was not penetrated to avoid the possibility of contaminating the lower aquifer.

The CD Landfill is underlain by yellow-brown, gray, and black silty sands with varying amounts of clay. (The uppermost deposits are most likely representative of the fill operation used to create the site, rather than Columbia Group lithology.)

During this investigation, only one aquifer was penetrated at the study area: an unconfined, water table aquifer situated within the fill deposits and deposits of the Columbia Group. Groundwater flows to the east and northeast across the site. The hydraulic gradient is shallow, averaging 0.0043 ft/ft. Aquifer recharge is by predominately from infiltration and possibly by regional groundwater flow.

Contaminant Evaluation Results

Soils

Soil contamination at the site appears to be limited to cadmium, iron, and lead, although TOX concentrations were present at moderate levels (80 mg/kg). The concentration levels are extremely variable; it is difficult to correlate these data to determine contaminants point sources.

Extremely high iron concentrations are widespread across the site, ranging from 1,934 parts per million (ppm) to 142,293 ppm. Low to moderate cadmium concentrations ranged from 0 to 28.4 ppm, and lead ranged from 0 to 4140 ppm. No guidelines currently exist for remedial action for these parameters in soils.

Sediment

Except for sediment location SE-5, cadmium and lead impact appear minimal. The highest concentrations were detected is SE-5, which contained 4.9 ppm cadmium and 145 ppm lead. In addition, the highest TOX and iron concentrations were 1.4 ppm and 93,700 ppm, respectively. Concentrations appear to increase to the east (except for in SE-5), suggesting that offsite migration is occurring via surface water.

Groundwater

The groundwater at the landfill has not been significantly impacted by cadmium. However, several parameters did exceed the recommended standards or guidelines set forth by the Virginia Water Control Board (VWCB), including lead, iron, TOC, hardness, and sodium. Lead was exceeded at locations MW-2, MW-4, MW-5, and MW-6; iron was widespread in all sampling locations; total organic carbon (TOC) was exceeded at locations MW-2 and MW-4; hardness was exceeded in all sampling locations; and sodium was exceeded in MW-4. TOX is widespread across the site; however, no guideline or standard exists for comparison.

Surface Water

TOX, TOC, sodium, and iron were detected in every sample. The highest concentration was iron at 38,100 parts per billion (ppb) (Round 2), and the second highest was TOX at 420 ppb (Round 1); all iron concentrations exceeded VWCB standards. Due to the constant recharge from offsite and the lack of background samples, the nature and extent of contaminants in the surface water remains inconclusive.

Recommendations

Recommendations were broken down into three separate categories:

Unpermitted landfill:

- Determine the solid waste boundary and contaminant point sources by geophysical surveys.

- Continue quarterly sampling and analysis of groundwater from existing wells according to Part V of the Phase I requirements of the Solid Waste Management Regulations (SWMR).
- Perform additional surface soil sampling to evaluate the risk assessment.
- Prepare and submit a closure plan.

Permitted landfill:

- Determine the solid waste boundaries and contaminant point sources by geophysical surveys. The surveys will assist in locating the monitor wells and soil borings.
- Install a minimum of three downgradient and one upgradient groundwater monitor wells.
- Conduct quarterly sampling and analysis of groundwater from the above wells according to Part V of Phase I of the SWMR.
- Prepare and submit a closure plan for the 5-acre landfill.

RI/FS

- Identify all solid waste boundaries and contaminant point sources.
- Install monitor wells. Sample surface soil, subsurface soil borings, and groundwater to determine the degree and extent of onsite and offsite contamination.
- Following completion of the site investigation, perform a risk assessment to determine the potential risk to human health and the environment.

1.0 INTRODUCTION

1.1 Purpose of Report

In response to the Superfund Amendments and Reauthorization Act (SARA) of 1986, the Navy has changed its program to follow SARA's guidelines, which requires each Federal facility listed on the Federal Hazardous Waste Compliance Docket to follow the rules, regulations, and criteria established by the Environmental Protection Agency (EPA). CD Landfill was one of the sites listed on the Federal Hazardous Waste Compliance Docket. Therefore, under the Navy's new program, Environmental Science & Engineering, Inc. (ESE) has been contracted to perform an expanded Site Investigation (SI) to provide recommendations to develop a final Remedial Investigation/Feasibility Study (RI/FS). In addition, ESE initiated a groundwater monitoring program that complies with Phase I of the Virginia Department of Waste Management (VDWM) state landfill closure requirements.

1.2 Site History

Part of the Sewells Point Naval Complex, CD Landfill is located on the east side of Hampton Boulevard, 0.5 mile south of the Taussig Boulevard intersection (Figure 1-1). When the Navy purchased the site in 1974 from Norfolk and Western Railway Company (Navy, 1974), they began landfilling construction debris, ash, and sandblasting grit began that same year. The ash was generated by a salvage fuel boiler and power plants on the Norfolk Naval Base, and the sandblasting grit came from the Naval Aviation Depot (Naval Energy and Environmental Support Activity (NEESA), 1983). Figure 1-2 chronologically illustrates the timing and placement of the fill.

Fill was placed in the eastern half of the site from 1974 to 1979, and a small portion in the southeast corner of the site was removed in 1979 to allow for a runway expansion project. Filling operations began and ended in the western half of the site from 1979 to 1987, respectively.

The Virginia Department of Health (DOH) granted the Norfolk Naval station a permit (No. 286) in November 1979 to operate a 5-acre parcel to receive non-hazardous wastes (e.g., construction debris and non-biodegradable waste). The permit excluded fly ash, incinerator residues, chemicals, and asbestos, although the site continued to receive sandblasting grit until 1981 when the material was tested and classified as a hazardous waste. Materials such as demolition debris and other inert waste continued to be deposited until landfill operations ceased on 15 June 1987. The Navy then began to follow procedures to close the 5-acre permitted portion of the landfill in accordance with state regulations. The closure plan included reducing infiltration and minimizing surface erosion by capping the permitted parcel.

1.3 Previous Investigations

The Navy Assessment and Control of Installation Pollutants (NACIP) Program was promulgated in 1980 to systematically identify, assess, and control contamination from past hazardous material operations that pose a potential threat to human health or the environment. The Initial Assessment Study (IAS) was conducted as the first phase of the NACIP Program to collect and evaluate evidence indicating the existence of pollutants that may have contaminated sites at the Sewells Point Naval Complex and that may pose an imminent health hazard to people located on or off the installation. The IAS was conducted prior to the enactment of SARA, but fulfills the requirement for each Federal facility listed on the Federal Agency Hazardous Waste Compliance Docket to perform a preliminary assessment.

The IAS was conducted in May 1982. Significant quantities of cadmium dust were identified as having been deposited in the landfill from 1974 until 1981. This material was tested and exceeded the maximum contaminant level for cadmium and was classified as hazardous waste. To determine if offsite migration was occurring, recommendations were made to sample the existing contaminant migration pathway: the drainage ditch. Two locations were recommended to sample for cadmium in the surface water and sediment.

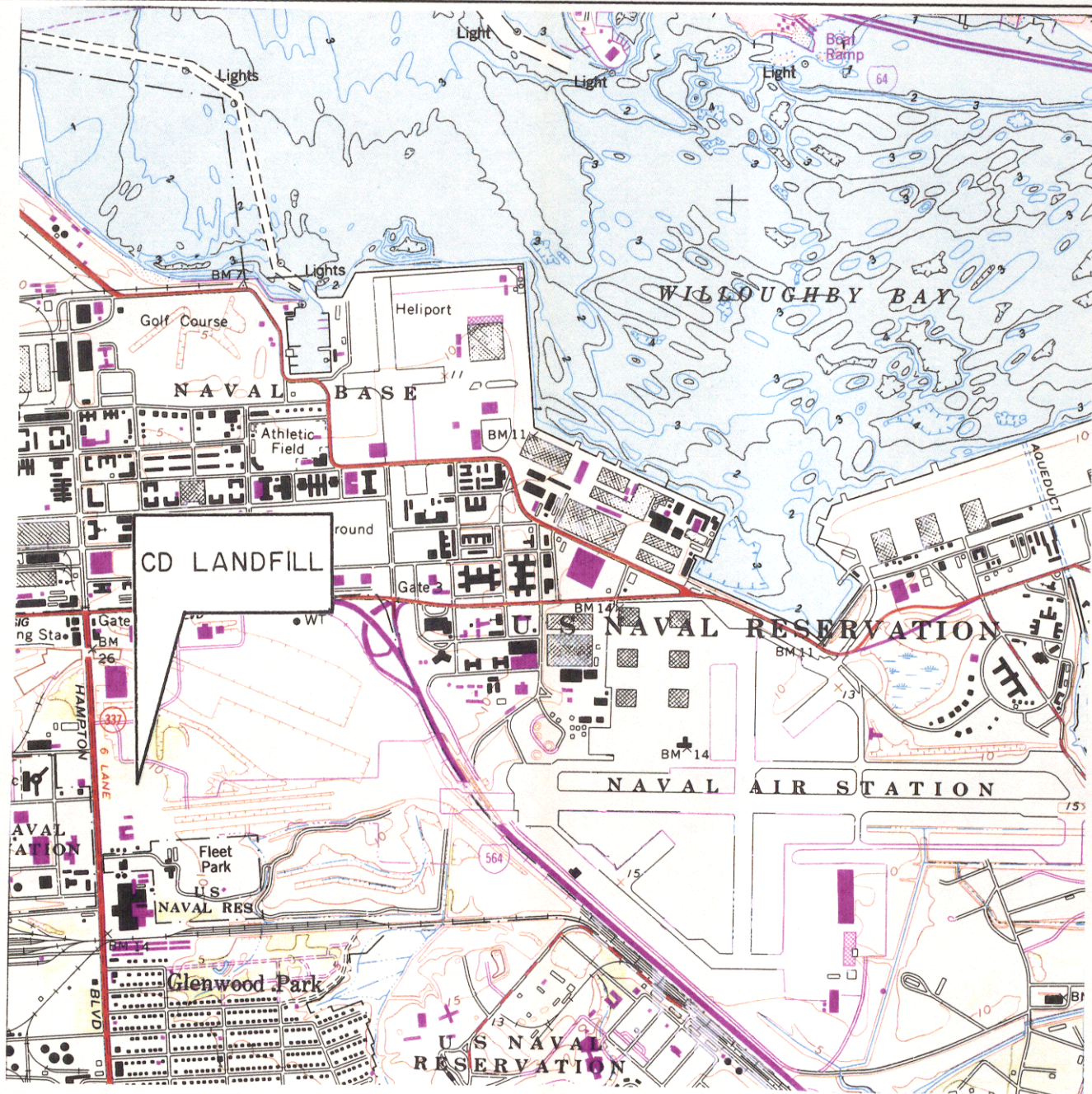
Subsequent to the IAS, the NACIP Program was redesigned as the Installation Restoration Program (IRP). The terminology and structure of the IRP were changed to conform to SARA. The confirmation study (LANTNAVFACENGCOM, 1983) was designed to verify the existence of contamination but it does not meet full RI requirements.

The confirmation study was conducted in January 1983. Surface water and sediment samples were collected at the three locations shown on Figure 1-3. The drainage ditches that border the site flow to the east, so two downgradient samples were collected quarterly, and one upgradient background sample was collected. Quarterly sampling continued until November 1983, and semi-annual sampling was performed until 1985. Analytical results from the confirmation study are presented in Appendix A.

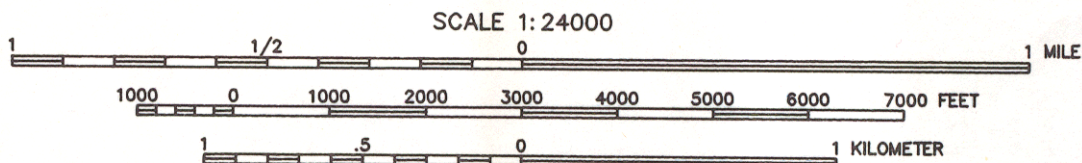
Cadmium was the only parameter tested during the study. Concentrations in the surface water ranged from less than 0.01 milligrams/liter (mg/l) on 1 January 1983 and 31 October 1983, to 0.02 mg/l on 29 April 1983 and 13 April 1984. Sediment concentrations ranged from 2 micrograms/gram ($\mu\text{g/g}$) on 31 October 1984 to 115 $\mu\text{g/g}$ on 31 October 1983. Tables 1-1 and 1-2 summarize the surface water and sediment concentrations, detected during the confirmation studies conducted in 1983.

No guidelines existed for cadmium in non-drinking surface waters and sediments at the time of the evaluation. However, compared to existing Virginia Surface Water Drinking Standards (0.01 mg/l), 70 percent of the surface water samples were measured above standards (Table 1-1). Cadmium concentrations within the sediment were compared with EPA Region V guidelines for soil (6 $\mu\text{g/g}$). Approximately 70 percent of the sediment samples collected were considered heavily polluted soils (Table 1-2).

Based on past records and laboratory analysis during the confirmation study, two recommendations were considered for CD Landfill: no-action and containment. The no-action alternative was considered for the pre-1979 fill area because any future construction activities would increase the exposure risk of metals and asbestos to the workers and the environment. The permitted fill area was recommended for containment. The Navy submitted plans in 1987 to close the 5-acre area as a construction/demolition/debris landfill.



UTM GRID AND 1984
MAGNETIC NORTH
DECLINATION AT
CENTER OF SHEET



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SOURCE: USGS 7.5 MINUTE SERIES
NORFOLK NORTH QUADRANGLE



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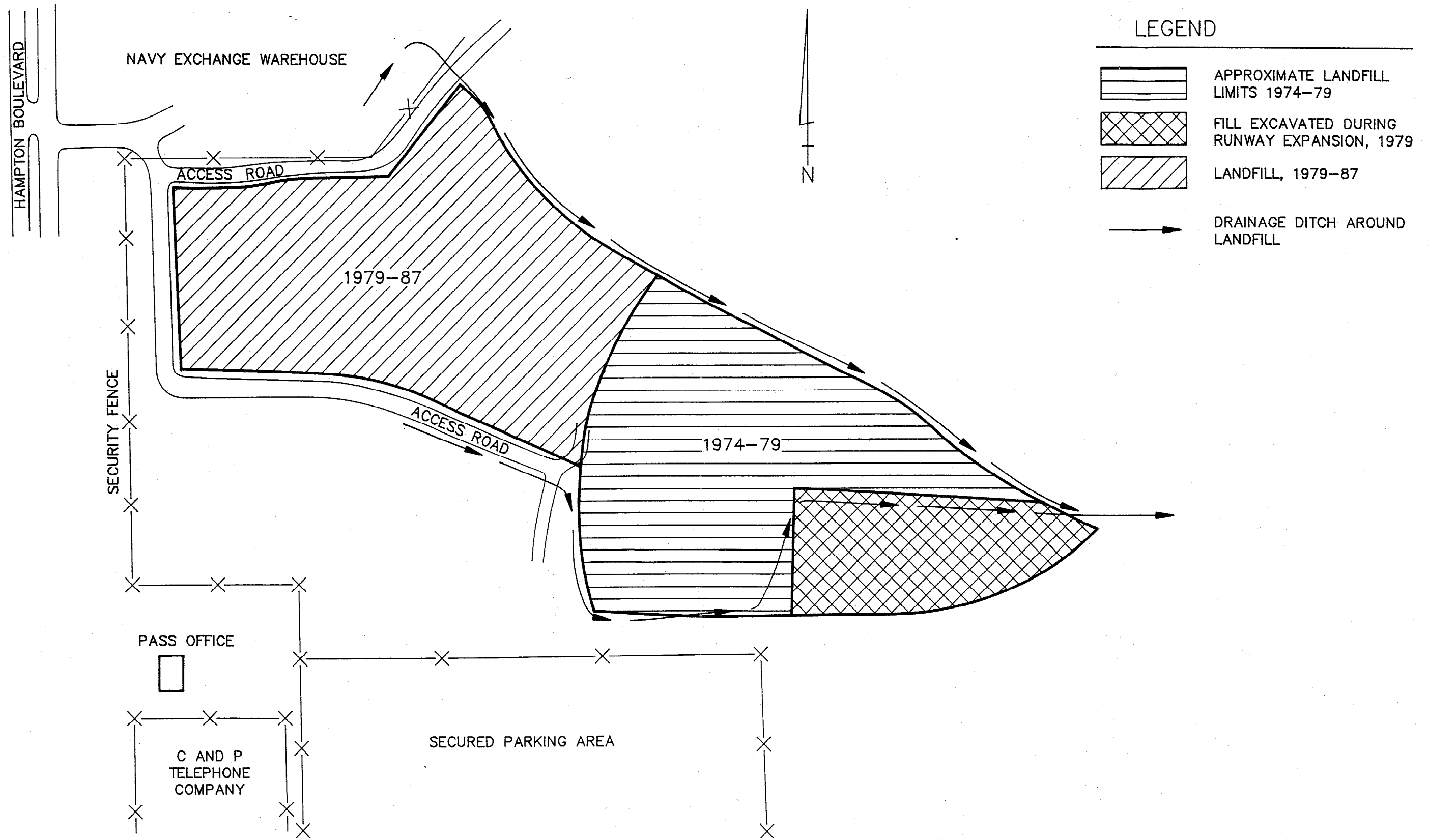
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1 -

TITLE

SITE LOCATION MAP

CLIENT LANTNAVFACENGCOM
CD LANDFILL

FIGURE
1-1



LEGEND

- APPROXIMATE LANDFILL LIMITS 1974-79
- FILL EXCAVATED DURING RUNWAY EXPANSION, 1979
- LANDFILL, 1979-87
- DRAINAGE DITCH AROUND LANDFILL

0 200
SCALE IN FEET



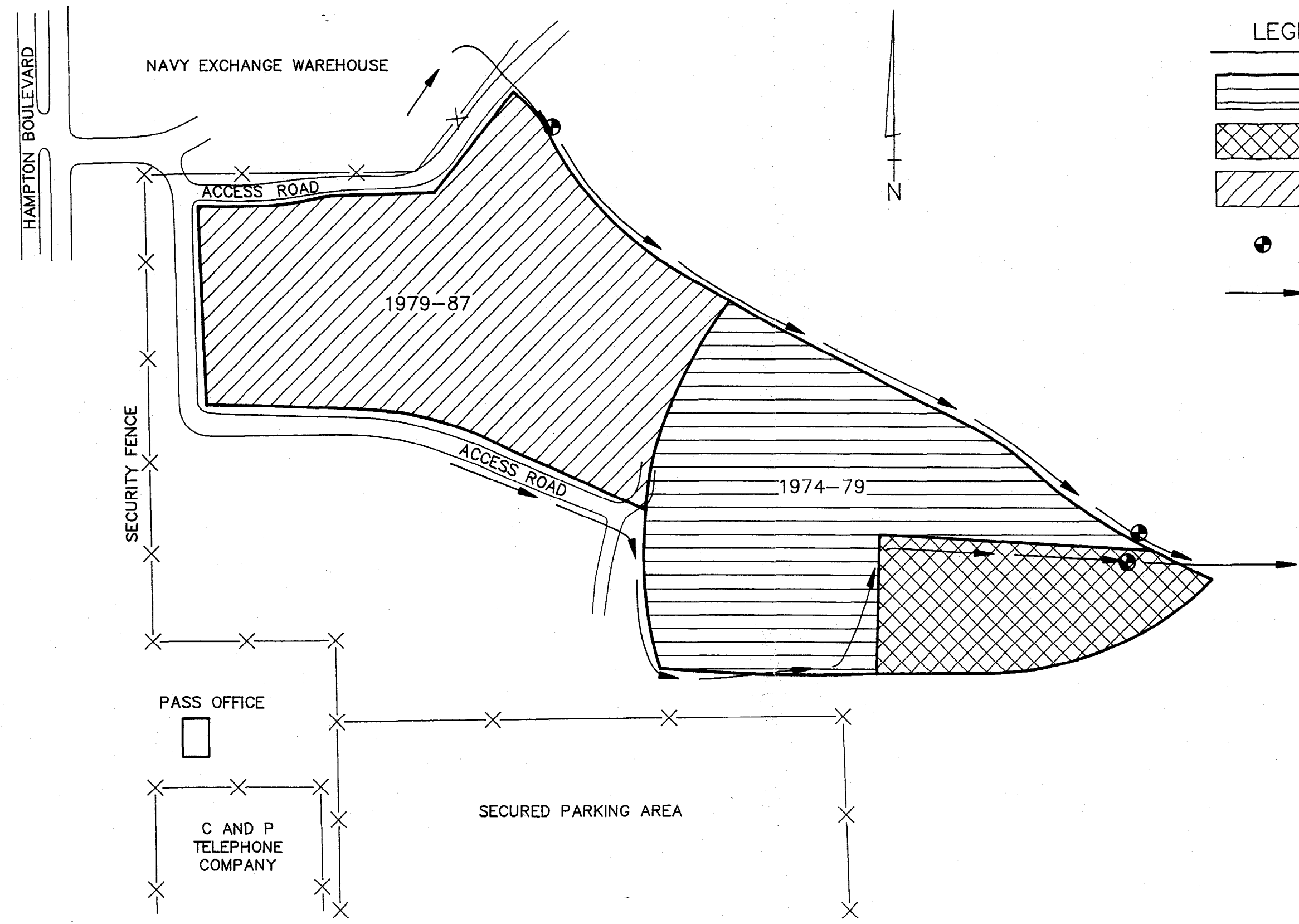
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DATE 8-1-91	SCALE 1"=200'	TITLE CHRONOLOGICAL LANDFILLING PERIODS	
DRAWN BY LAF	APPROVED BY		
JOB NO. 4901162	DWG. NO./ REV. NO. CLP62 / -	CLIENT LANTNAVFACENGCOM CD LANDFILL	FIGURE 1-2

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LEGEND

- APPROXIMATE LANDFILL LIMITS 1974-79
- FILL EXCAVATED DURING RUNWAY EXPANSION, 1979
- LANDFILL, 1979-87
- SURFACE WATER SAMPLING LOCATION
- DRAINAGE DITCH AROUND LANDFILL



0 200
SCALE IN FEET

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DATE 8-1-91	SCALE 1"=200'	TITLE CONFIRMATION STUDY SAMPLING LOCATIONS - 1983	
DRAWN BY LAF	APPROVED BY		
JOB NO. 4901162	DWG. NO./ REV. NO. CSS62 / -	CLIENT LANTNAVFACENGCOM CD LANDFILL	FIGURE 1-3

Table 1-1
Cadmium Concentration in Surface Water (mg/l)

Sample Date	Sample Location		
	Upstream	North Branch	South Branch
01/26/83	< 0.01	0.01	< 0.01
04/29/83	-	0.02	0.01
07/07/83	-	- (1)	- (1)
10/31/83	-	< 0.01	< 0.01
04/13/84	-	0.02	0.02
10/31/84	-	- (1)	- (1)
12/02/85*	-	0.014	0.018

Note: No surface water flow in ditches at time of sampling

* Date sample received by laboratory

Table 1-2
Cadmium Concentration in Sediment (Dry Weight), µg/g

Sample Date	Sample Location		
	Upstream	North Branch	South Branch
01/26/83	2.43	9.64	2.92
04/29/83	-	9.37	4.88
07/07/83	-	9.85	14.3
10/31/83	-	115	0.71
04/13/84	-	8.17	1.24
10/31/84	-	26.4	7.46
12/02/85*	-	16	2
EP toxicity, Cd, µg/l		321	24

* Date sample received by laboratory

2.0 SITE CONDITIONS

The site and meteorological characteristics of the study area were evaluated using a variety of office and field methods. Topographic maps were readily available, as were records concerning local climates, previous land use, etc.

2.1 Demography

Several residential communities are located within a 1-mile radius of the landfill, including both temporary and permanent quarters for Naval personnel, and a small private residential neighborhood of approximately 1500 residents called Glenwood Park (Commerce, 1983). The following Naval facilities support Naval personnel and are located within the immediate vicinity of CD Landfill: warehouses and an exchange/commissary/dispensary complex to the north and northeast; an air station runway that borders the east; the pass office, fleet parking lot, and a recreational park to the south and southeast; and a base tour office and parking lots to the west.

2.2 Land Use

Land use was primarily for construction debris and inert waste disposal prior to June 1987; no other activities except grounds maintenance were recorded from 1987 to present. Only authorized personnel have access to the enclosed site. Available records or maps do not disclose the full areal extent of contaminant point sources or permitted and unpermitted landfill boundaries.

2.3 Climatology/Meteorology

The Norfolk area climate is classified as oceanic (Siudyla, et al., 1981); winters are relatively mild, and summers are warm and long. The temperatures rarely exceed 100°F or fall below 20°F, and average 78.6°F in July and 41.2 °F in January (Atlantic Division, Naval Facilities Engineering Command (LANDIVENGCOM), 1980b). The mean minimum and maximum temperatures are 50.5°F and 68°F.

The average precipitation is 44 inches per year and well distributed throughout the seasons. The portion of precipitation that occurs as snowfall during December and January averages 9.1 inches per year (LANDIVENGCOM, 1980b).

Wind direction is from the southwest in early winter, spring, and early summer. Wind velocities are normally less than 12 knots; the highest velocities occur at night and rarely exceed 20 knots. No site-specific meteorologic data were collected during this investigation.

3.0 SITE INVESTIGATIONS

3.1 Field Investigation Methods

The methods employed during the CD Landfill field investigation were selected to fill the data gaps in the previous investigations and to begin completing an expanded SI. In addition, ESE initiated a groundwater monitoring program to detect any contaminants migrating beyond the solid waste boundary, according to Phase I of VDWM state landfill closure requirements. An overview of the field activities follows, as outlined in the Work Plan and Sampling and Analysis Plan (ESE, November 1990).

These methods were used to determine if the site was releasing hazardous substances, pollutants, or contaminants into the environment that may require a removal action. The work included identifying and quantifying pollutant concentrations migrating offsite to accomplish the first half of quarterly groundwater monitoring according to VDWM landfill closure requirements.

3.1.1 Geological Investigation

To fully determine the nature and extent of contamination, the regional and local geology must be understood. In conjunction with available resources (United States Geological Survey (USGSs) maps, past records, etc.), site-specific field data are used to characterize substratum physical properties. This is vital in determining the geologic formations and water-bearing zones that underlie the site. Regional geology was determined using information available prior to the field investigation, assisting in determining the expected subsurface conditions and practical methods to be exercised during investigation.

Six exploratory borings were advanced to 25 feet using continuous-flight, 5-foot hollow-stem augers and an all-terrain vehicle (ATV) with a mounted drill rig. Soil samples were collected every 5 feet to describe the lithology of each boring by texture. The geologist field-classified each sample and logged it on dedicated log sheets (Appendix B). The soil boring locations, labeled MW-1 to MW-6, are shown on Figure 3-1.

3.1.2 Groundwater Investigation

Groundwater quality and site hydrogeology were determined to assist in evaluating offsite contaminant migration. Groundwater monitor wells were installed in the six borings described in Section 3.1.1; well locations were chosen to detect offsite contaminant migration. Four wells were installed downgradient to detect potential contaminant migration from the landfill (Figure 3-1), and two wells were installed upgradient to determine representative background levels. Horizontal hydraulic gradients were calculated by measuring static water levels at each well and then calculating their elevation relative to mean sea level (msl).

Six monitor wells were constructed of 2-inch ID, flush-joint, threaded polyvinyl chloride (PVC) well screen, riser, and casing. Figure 3-2 illustrates a typical monitor well construction diagram. A 0.01-inch slotted PVC well screen was used in each well. A sand pack (#2 Morie sand or equivalent) was placed around the slotted well screen to approximately 2 feet above the top of the screen, and a bentonite seal (minimum thickness of 1 foot) was placed on top of the sand pack. Finally, a grout mixture of two parts sand and one part cement, thoroughly mixed with the specified amount of potable water, was placed in the borehole to ensure a proper seal. Actual construction diagrams for each well are included in Appendix C.

All wells were developed a minimum of 24 hours following installation to remove fine-grained materials and any contamination that may have entered during construction. This was accomplished by removing the well volume three to five times by continuous low-yield pumping. All fluids generated from well development were discarded on the landfill surface, per the Navy's request.

A sampling program was designed to collect groundwater samples during two separate rounds. Round 1 was collected five days after well development, and Round 2 was collected 90 days later. Groundwater samples were collected from each of the six

shallow monitor wells. To evaluate groundwater quality, the following procedures were used to collect the samples:

1. Samples were collected a minimum of five days after development to allow the wells to reach equilibrium.
2. Immediately prior to collecting a sample, the static water level was measured below the top of the well PVC casing and recorded in the field notebook.
3. Wells were sampled according to degree of contamination: wells expected to be uncontaminated were sampled first, followed by those with potentially increasing levels of contamination.
4. Prior to collecting a sample, the volume of water in the well casing and annulus was purged three to five times until water temperature, specific conductivity, and pH stabilized. The total amount of fluid purged was measured and recorded.
5. During Round 1, one set of groundwater samples was filtered for metals only to determine the dissolved metal concentration in the groundwater. A set of unfiltered samples was also taken to compare the total metal concentration and the dissolved concentration.
6. A precleaned stainless steel submersible pump with dedicated Teflon® tubing was used to collect the filtered and unfiltered samples for the metals analysis. The samples for other parameters tested during this event were collected in a precleaned stainless steel bailer with dedicated Teflon® rope. Prior to collecting the water samples in the precleaned containers, the first filled bailer was discarded.

7. No filtered samples were collected for comparison during the second sampling round. Metal analytes, excluding iron, were not detected during the first sampling event.
8. Sampling equipment was decontaminated between sampling locations according to procedures outlined in Section 2.1.3 of the Sampling and Analysis Plan (ESE, 1990).

3.1.3 Surficial Investigation

3.1.3.1 Surface Water

During Round 1 and Round 2 of the sampling program, surface water was collected at five locations (Figure 3-1) to establish surface water quality characteristics, determine the nature of any contamination, and determine whether contaminants are surficially migrating offsite. The following sample collection procedures were used:

1. Samples were collected at one-half to two-thirds the depth of water, when possible.
2. A dedicated, precleaned container was used to collect the sample, which was then transferred to the appropriate container for analysis.
3. Downstream samples were collected first, upstream of the sampler's body.
4. Care was taken not to stir up bottom sediments prior to and during sampling.

Due to an insufficient volume of water, three water samples (rather than the five proposed) were collected during Round 1, and two water samples were collected during Round 2. Shortly after Round 1, a second effort to collect the water from the two dry

locations failed. However, additional water was collected from the same three locations for total organic halogens (TOX) and total organic carbon (TOC) analyses. A second attempt was not made after Round 2.

3.1.3.2 Sediment

Five sediment samples were collected during Round 1 at the same locations where the surface water was collected. The sediment samples were collected from the top 3 inches below the sediment surface with a precleaned stainless steel scoop decontaminated by the procedures outlined in Section 2.1.3 of the Sampling and Analysis Plan (ESE, 1990). Care was taken to collect and retain the "fines," which often contain the highest concentration of chemical constituents.

3.1.4 Wetlands Delineation

3.1.4.1 Methodology

The initial review of existing literature and the study area mapping proved inconclusive. The Soil Conservation Service (SCS) has not produced a soil survey for the City of Norfolk, and no site-specific information was available. Additionally, the USGS Norfolk North, Virginia topographic quadrangle did not depict any potential wetland areas on the site. The United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) quadrangle could not be obtained prior to the onsite investigation: the site consists of "made land" soils over the landfill. According to Navy sources, the present cover was completed in 1988. Large portions of the site are not level graded, including several larger mounds that vary in size and a somewhat centrally located area with many small hills and trenches (described as unlevel ground on Figure 3-3).

The three-parameter approach described in the "Federal Manual for Identifying and Delineating Jurisdictional Wetlands" (FICWD, 1989) was used for the field identification of wetlands. A field survey of the site's vegetation, soils, and hydrology was conducted on 26-27 February and 4 March 1991. Various points, distributed along the wetland-upland boundaries and within the wetland areas, were chosen for detailed soil and vegetation

descriptions and logged (Appendix D). Additional unlogged observations were gathered as necessary to ensure adequate site coverage.

Vascular plant species were identified using nomenclature that conforms with the "National List of Scientific Plant Names" (USDA/SCS, 1982). The wetland indicator status of plants was determined using the "National List of Plant Species that Occur in Wetlands: Northeast (Region One)" (Reed, 1988).

Soil borings were taken with a 3.25-inch diameter, hand-held bucket auger. Profile descriptions were made following guidelines established in "Soil Taxonomy, Agricultural Handbook 436" (USDA/SCS, 1975) and the "Soil Survey Manual" (USDA, 1951). The samples were not assigned to series and drainage class due to the lack of a local soil survey and the extreme disturbance to the site. Much of the soils were "made land," lacking typical soil profiles and field indicators for hydric soils. Special emphasis was given to vegetation observations and wetland hydrology indicators (including surface topography, depth to soil saturation or standing water, and sedimentation).

Based on this survey methodology, wetlands were identified and the wetland/upland boundaries were marked with sequentially numbered stakes and flags. These points were subsequently located, and their positions were determined by licensed land surveyors and plotted on a survey plat (Figure 3-3).

3.1.4.2 Survey Results

Two wetlands were delineated and designated as the North Ditch and South Ditch (Figure 3-3). The North Ditch is a channelized intermittent creek delineated from a culvert discharge beneath Access Road to the western corner of the proposed fence boundary. The South Ditch is a small drainage swale that lies along an onsite gravel road and flows roughly parallel along the southern boundary of the proposed fence.

The North Ditch wetland boundary generally follows the toe of the bank of the ditch and extends slightly outward toward the landfill in three places. The northern boundary was field delineated with points designated AA-1 through AA-14, and the southern boundary with points designated AB-1 through AB-17. Outward expansions beyond the toe of the bank were delineated between points AB-5 and AB-7, AB-8 and AB-12, and AB-15 and AB-17.

Standing water was observed in most of the creek at the time of the wetland delineation. No standing water was observed from the culvert discharge to a point past AB-2, or in an area starting just beyond AB-4 to AB-5.

Plant species found in and along this wetland included: groundsel bush (Baccharis halmifolia), willows (Salix spp.), sweet gum (Liquidambar styraciflua), southern bayberry (Myrica cerifera), common reed (Phragmites australis), soft rush (Juncus effusus), bushy bluestem (Andropogon glomeratus), goldenrods (Solidago spp.), Japanese honeysuckle (Lonicera japonica), smartweeds (Polygonum spp.), grapes (Vitis spp.), and greenbriars (Smilax spp.).

The South Ditch wetland boundary is best described as a small drainage swale that lies between the proposed southern fence boundary and an onsite gravel road. The northern boundary was field delineated with points designated BA-1 through BA-16, and the southern boundary with points designated BB-1 through BB-18. This wetland begins as a ponded area in the western portion and narrows into a ditched area along the road to the east. The South Ditch collects and holds surface runoff from the surrounding areas; standing water was observed in many portions. However, rainfall occurred the weekend prior to South Ditch wetland delineation.

Plant species found in this wetland included: common reed (Phragmites australis), groundsel bush (Baccharis halmifolia), common clotbur (Xanthium chinense), goldenrods (Solidago spp.), panic grasses (Panicum spp.), bushy broomsedge (Andropogon

glomeratus), yellow fox-tail grass (Setaria glauca), and an unidentified aster (Aster spp). Identifying additional species was complicated by the early seasonal timing of the delineation.

The soils were found to be "made land" in both wetland and non-wetland areas. The soils on top of the landfill area included layers of ash, shell fragments, and natural soils of unknown origin. The soils in the North Ditch were also of indeterminant origin: they were either fill or lower horizons of original soils with the upper horizons removed.

Both direct and indirect hydrologic evidence was used to determine the presence or absences of wetland hydrology. Direct evidence included observed surface water, the presence of saturated zones close to the surface, and the determination of depth to standing water in the boreholes. Indirect evidence included surface observations indicative of ponding, flooding, or flow channels and plant morphological features indicative of prolonged soil saturation (mostly adventitious roots). Vegetative and topographical changes were used in conjunction with the hydrological indicators to make a final wetland boundary determination.

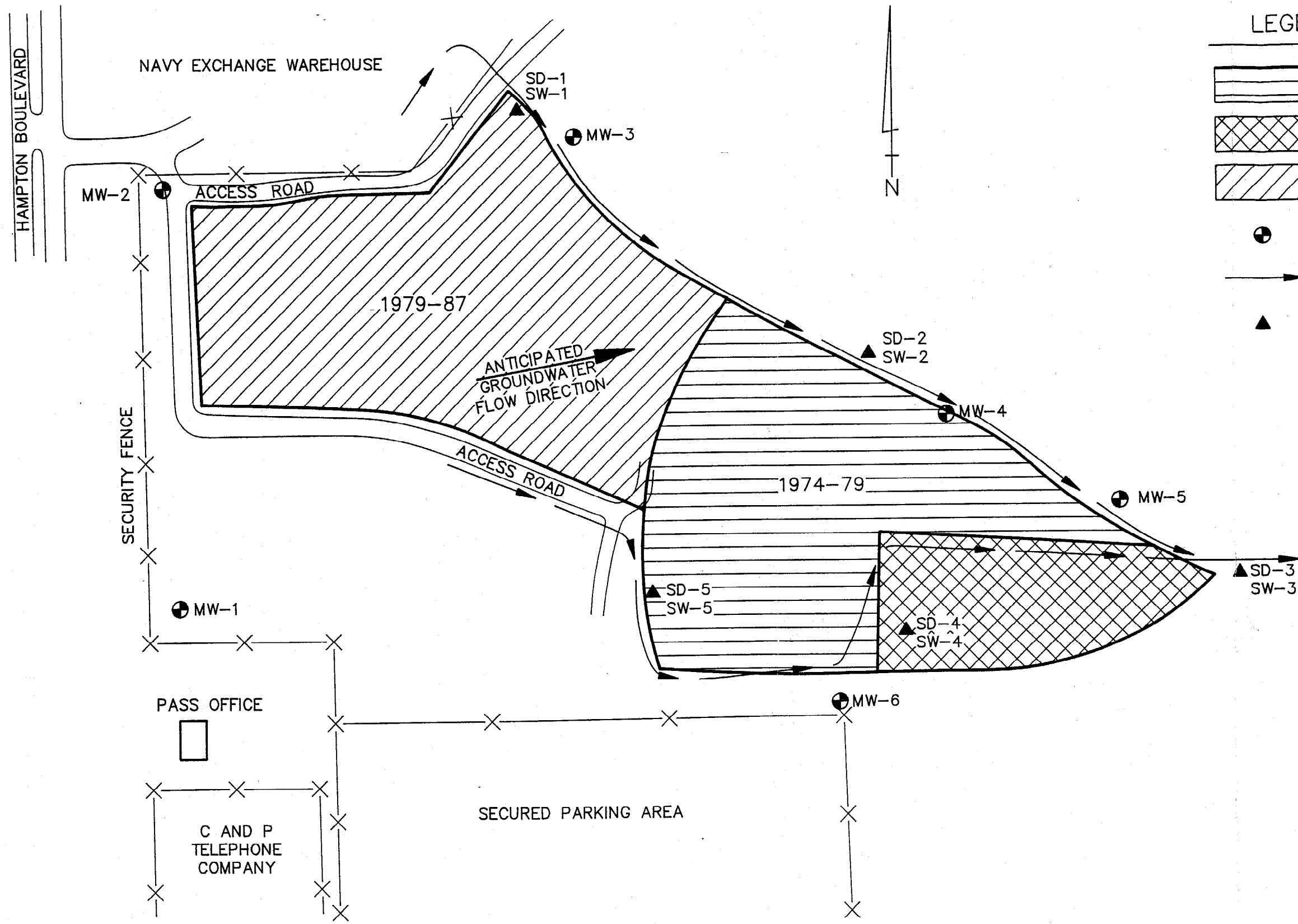
The North Ditch, an approximately 0.1-acre wetland, includes the entire creek bed and several small overflow basins. The northern boundary follows the toe of the bank, generally 4 to 5 feet high. The southern boundary also follows the toe of the bank, but includes several basins that pond when the creek floods. These small basins are generally vegetated with common reed (Phragmites australis) and show signs of standing water (water-stained leaves). These basins contain some of the few soils that exhibit expected characteristics (e.g., soil profile characteristics of hydric soils).

The South Ditch, an approximately 0.08-acre wetland, was more difficult to delineate. Vegetative cover, topographic contours, and evidence of ponding (including adventitious roots on some plants and the development of a mucky layer in the A horizon) were used

to delineate the southern boundary. The northern boundary was delineated primarily using the toe of the bank along the road.

Rainfall over the weekend prior to the delineation had ponded in many portions of the South Ditch. Aquatic insects were observed in some of these ponded areas, helping to reinforce the boundary delineation.

The hydrological regime driving the South Ditch wetland appears to be surficial runoff from the landfill, creating ponding on top of soils with a low permeability layer. Other smaller ponded areas were evident elsewhere on the site, but were isolated and insignificant in size.



LEGEND

- APPROXIMATE LANDFILL LIMITS 1974-79
- FILL EXCAVATED DURING RUNWAY EXPANSION, 1979
- LANDFILL, 1979-87
- MONITOR WELL LOCATION
- DRAINAGE DITCH AROUND LANDFILL
- SURFACE WATER/SEDIMENT SAMPLING LOCATION

SECURITY FENCE

MW-1

PASS OFFICE

C AND P TELEPHONE COMPANY

ANTICIPATED GROUNDWATER FLOW DIRECTION

ACCESS ROAD

SECURED PARKING AREA

MW-6

0 200
SCALE IN FEET



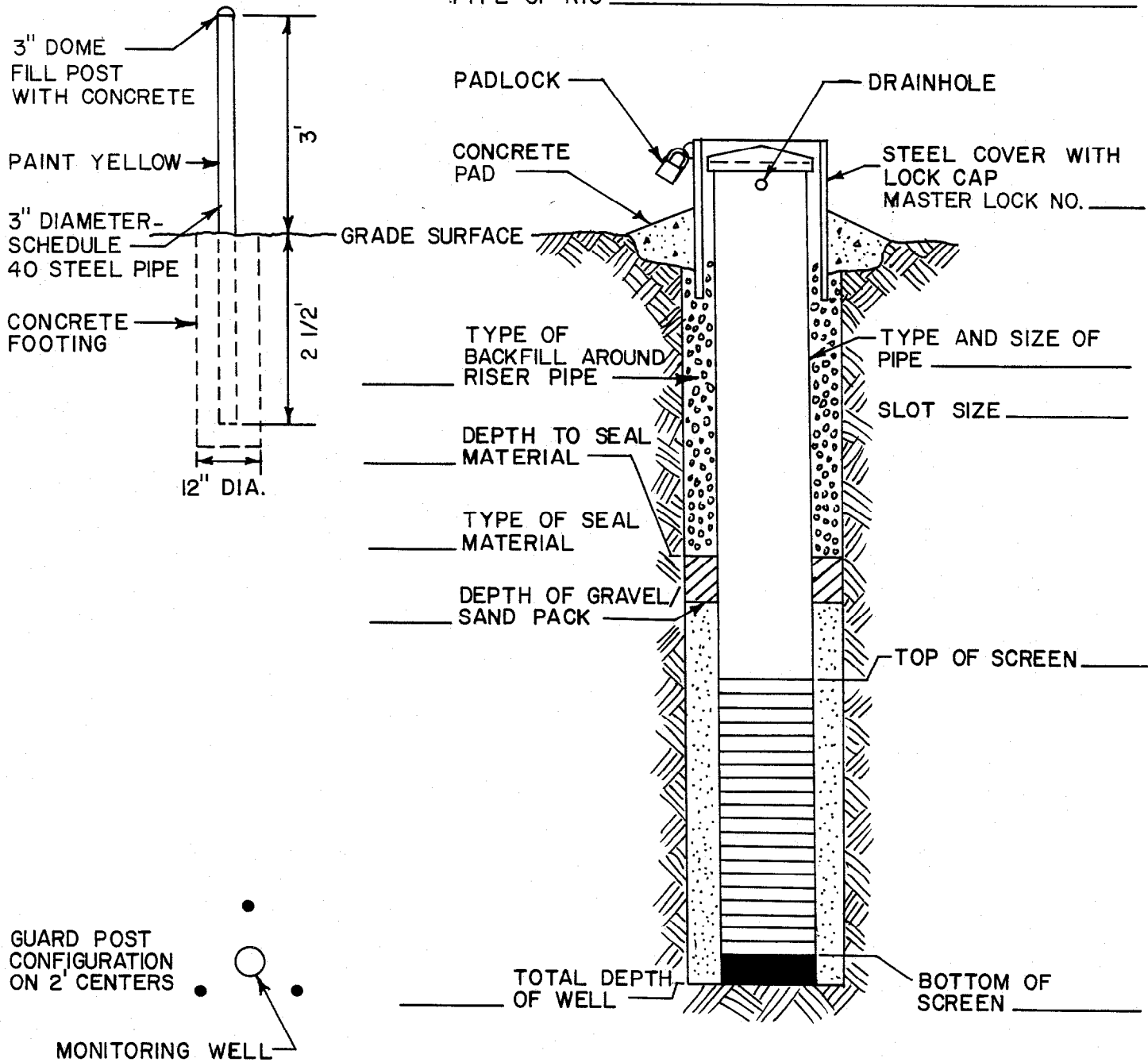
Environmental Science & Engineering

DATE 8-1-91	SCALE 1"=200'	TITLE MONITOR WELL AND SAMPLING LOCATIONS	
DRAWN BY LAF	APPROVED BY		
JOB NO. 4901162	DWG. NO./ REV. NO. CD62 / 1	CLIENT LANTNAVFACENGCOM CD LANDFILL	FIGURE 3-1

01270D03Z

3" GUARD POST

MONITOR WELL NO. _____ DATE _____
 PROJECT _____ INSTALLED BY _____
 TYPE OF RIG _____

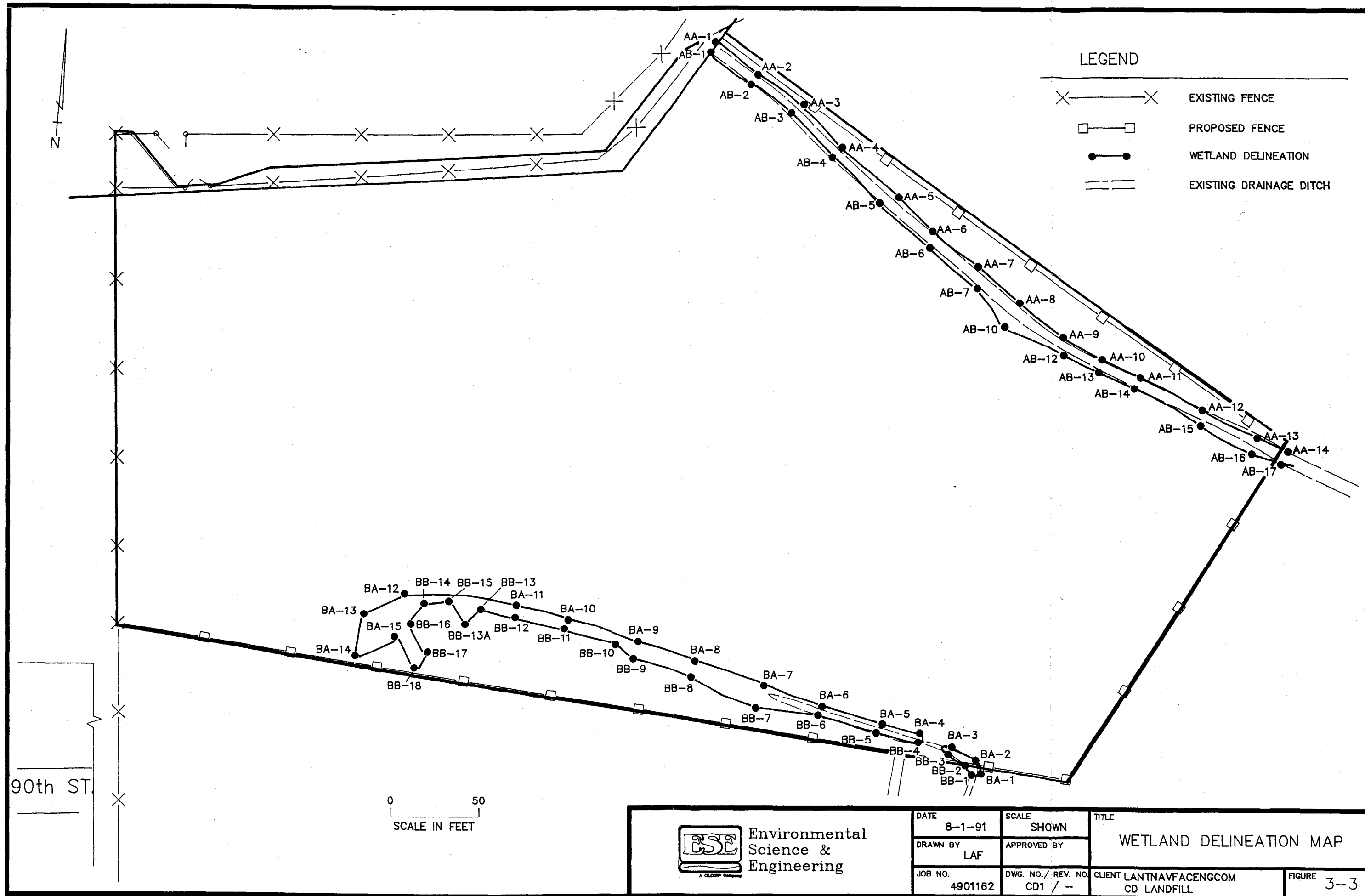


INSPECTED BY: _____

TYPICAL MONITORING WELL CONSTRUCTION



FIGURE 3-2



01270D04Z

4.0 PHYSICAL CHARACTERISTICS

The physical characterizations and observations made at the study area were performed using a variety of field and office methods. The field methods were employed to explore the site geology and hydrogeology and to record physical features. The office methods helped verify the field investigation results and determine site history, regional geology, and hydrogeology.

4.1 Surface Features

CD Landfill is on a low-lying peninsula which is part of the Atlantic Coastal Plain Physiographic Province. Site elevation ranges from msl to 15 feet above ground surface. Drainage in the area is sluggish, and most streams are tidally affected.

The present topography of the landfill is relatively flat, although it has been reworked by landfilling operations. The two landfill areas (1979-1987 and 1974-1979) were not identified: the confirmation study assumed that the landfill boundaries are separated by a series of soil mounds. The site is currently covered with scrubby underbrush and a few small deciduous trees. A drainage ditch, is assumed to form the solid waste landfill boundary, borders the north, east, and south site areas, and the intermittent surface water in it flows to the east. The ditch was moved from its natural position to its present location as a result of past landfilling operations. A Naval Air Base runway is located in the eastern portion of the fenced area, and only authorized personnel have access. The drainage ditch separates the study area and the air strip.

Construction debris was evident everywhere onsite during the field activities. In addition, a package of pesticides was located on the bank in the northern drainage ditch area. Abundant wildlife observed during all phases of the investigation is described in Section 3.1.4.

4.2 Contaminant Sources

CD Landfill received a series of inert and solid wastes starting in 1974, including construction debris, sandblasting grit, spent rice hulls, and ash. An estimated 1500 cubic yards of sandblasting grit was deposited in the landfill from 1974 to 1981. In 1981, the grit was tested according to EPA's Extraction Procedure Toxicity (EP TOX) test, which simulated the leaching environment that potentially occurs at a landfill. The final results of this test classified the grit as hazardous.

Approximately 90 tons of spent rice hulls were deposited directly on the surface of the landfill until 1983. The rice hulls, used for blasting cadmium plate parts, were tested using the same procedures as sandblasting grit and classified as hazardous waste.

A third potential source of contamination is the estimated 8,500 tons of ash deposited in the landfill from 1974 to 1979. The EP TOX test was performed, and the cadmium concentrations were less than EP TOX limits. However, the same material was tested several years later and found to exceed EP TOX limits for cadmium and lead.

A final source of contamination is the construction debris deposited in the landfill from 1974 until closure in 1987. An undetermined volume of various types of construction waste, including asbestos, was deposited during the 13 years of operation. No other potential contaminants sources have been investigated or recorded to date.

4.3 Geology

4.3.1 Regional Geology

The CD Landfill is located in the outer Atlantic Coastal Plain Physiographic Province, characterized by low elevations and relief, sloping gently eastward. Several thousand feet of unconsolidated sediments are found in the Tidewater area. The six geologic units located in this area are: Patuxent Formation, "Transitional beds," Mataponi Formation,

Calvert Formation, Yorktown Formation, and the Columbia Group (Siudyla, et al., 1981). Figure 4-1 briefly describes the stratigraphic and hydrogeologic units.

The uppermost geologic unit and youngest formation is the Columbia Group; its average thickness ranges from 20 to 50 feet. The beds are characterized by light-colored clay, sand, and silt. Monitor wells installed at the CD Landfill confirmed the sand depth to an average of 23 feet and dark clays from 23 to 25 feet below surface.

The Yorktown Formation underlies the Columbia Group and is Miocene in age. The unit is characterized by coarse sand, gravel beds, and abundant thick shell beds. The formation ranges in thickness from 300 to 400 feet. ESE did not encounter this formation during the field investigation.

The Calvert Formation is Miocene in age and underlies the Yorktown Formation with an average thickness of 200 feet. It is characterized by fine-grained, light-colored sands, dark blue to black sandy clays and diatomaceous earth beds (Wentworth, 1930).

The Mattaponi Formation consists of glauconitic sand, glauconitic clay, and shells; its estimated thickness is 65 feet (Wentworth, 1930). This upper Cretaceous formation overlies the Patuxent Formation and Transitional Beds.

The "Transitional beds" and the Patuxent Formation are Cretaceous in age and are the oldest unconsolidated units found in the Tidewater area. Both units are characterized by interbedded gravels, sand, silt, and clay; it is difficult to distinguish the two.

4.3.2 Site-Specific Geology

During the site investigation, ESE was able to confirm (by soil sampling) that the site is immediately underlain by yellow-brown sands with varying amounts of silt and clay

(SM-SC). A moderate to dark clay strata was encountered in MW-1, MW-2, MW-5, and MW-6 at an average depth of 21.2 feet beneath the ground surface. The clay strata was not penetrated, to prevent possible contamination of a lower aquifer. MW-4 through MW-6 have a lean to fat clay (CL-CH) stratum at various depths (to 11.0 feet). This material was classified in the field as disturbed soil placed as fill material.

The subsurface soil profile resembles that of the Columbia Formation. Soil borings were not extended below 25 feet, so comparison with the Yorktown Formation could not be made for this study. The soil descriptions for each location are presented in Appendix B.

4.4 Hydrogeology/Hydrology

Water resources at CD Landfill and the surrounding area consist of two major sources: groundwater and surface water.

4.4.1 Groundwater Occurrence

Groundwater supplies at CD Landfill consist of the water stored in the pore spaces of the underlying sediments. Regionally, two aquifers are thought to be present in the area, corresponding to the uppermost Columbia Group and the underlying Yorktown Formation, separated by a clay aquitard. The monitor wells installed at the site did not penetrate far enough to encounter the Yorktown Formation or the clay aquitard, although both have been confirmed at other locations at the base. The Yorktown aquifer produces water of sufficient quality for potable use.

The upper Columbia aquifer is an unconfined water table aquifer. Thickness has not been determined at the CD Landfill, but it is at least 25 feet thick as observed in the monitor wells installed at the site. The groundwater in the water table aquifer is not of sufficient quality to be used as a potable source; VDOH has restrictions on the use of water table aquifers as potable water sources. However, the water can be used for irrigation, industrial, etc.

Groundwater in the study area is sustained by precipitation that infiltrates the land surface. Average annual rainfall in Norfolk is 44 inches; total recharge is influenced by runoff and evapotranspiration at the CD Landfill. Runoff is not likely to result in much loss because the site is unpaved and well vegetated. Evapotranspiration probably has a more significant impact on recharge due to the dense vegetation. The annual recharge to the water table aquifer is not known, but is estimated to be between 15 and 20 inches.

Groundwater discharge from the water table aquifer is not fully understood, but is likely into Willoughby Bay to the northeast, the direction of flow.

4.4.2 Groundwater Movement

Regional (across the base) steady-state groundwater flow directions have not been fully evaluated. The flow pattern is likely to be complex: it is influenced by one or more of the tidal water bodies surrounding the base, as well as man-made drainage ways across the base and surrounding areas.

Onsite flow was determined from the liquid level data (Appendix E) collected from the monitor wells installed at the site during the field investigation. The water table across the site ranges from 4 to 7 feet above msl. The gradient and flow direction are generally to the east and northeast (Figures 4-2 and 4-3).

Horizontal gradients across the site in the water table aquifer were calculated by dividing the hydrostatic head difference between two points along a flow line (perpendicular to a contour line) by the horizontal distance between those two points. Measurements from two monitor wells located along a flow line provide the best data for calculating the gradients. Because the monitor well placement does not always allow this, measurements were taken from the groundwater contour maps. These measurements were used to calculate the following mean values for horizontal gradients across the site: 11 March 1991 at 0.0052 ft/ft, and 12 June 1991 at 0.0035 ft/ft. The difference in gradients and

hydraulic head distributions between the two events is likely due to seasonal fluctuations. Vertical gradient and in-situ aquifer conductivity tests (slug tests) were not within the project scope.

4.4.3 Surface Water

Surface water at the site is confined to the two ditches that merge at the southeastern site corner. The first ditch runs southeast from the access road to the north of the site (near MW-3), past MW-4 and MW-5. The second ditch runs west to east from the center of the fenced portion of the site, past MW-6, until its confluence with the first ditch. The confluence was the collection point for sediment sample SD-3 and surface water sample SW-3.

Water elevation measurements in the ditches were taken by the survey party the day after monitor well elevation data was obtained. Elevations are shown on the groundwater contour map for 11 March 1991 (Figure 4-2).

The data indicate that following precipitation events, the ditches recharge the groundwater across the majority of the site, except for the far eastern portion between surface water and sample locations SW-2 and SW-3. Here, surface water elevations are lower than groundwater elevations observed in the nearest wells (MW-4 and MW-5), suggesting that the groundwater discharges into the ditches, maintaining the that water flows in them. It appears that fluctuations in the groundwater table will greatly influence the amount of water in the ditches: the higher the groundwater table, the further to the west (in the ditches) that water will be found. Precipitation events will cause runoff and create flow in the ditches (recharging the groundwater by infiltration) until static conditions are again reached.

VIRGINIA

SYSTEM	SERIES	STRATIGRAPHIC UNITS		HYDROGEOLOGIC UNITS	DESCRIPTION OF HYDROGEOLOGIC UNITS
QUATERNARY	RECENT PLEISTOCENE	RECENT COLUMBIA GROUP		WATER TABLE OR QUATERNARY AQUIFER	Unconsolidated sand, silt and some gravel. Sand units yield quantities adequate for domestic and small industrial demands, used extensively for lawn watering. Unconfined aquifer.
TERTIARY	UPPER	CHESAPEAKE GROUP	YORKTOWN	YORKTOWN AQUIFER	Sand and shell beds main water-bearing units. Adequate for moderate public and industrial supplies. Artesian
	MIDDLE		CALVERT	CONFINING UNITS	Silt and clay predominant, minor sand lenses.
	EOCENE		NANJENDY	NOT FOUND IN STUDY AREA	
			MATTAPONI	EOCENE-UPPER CRETACEOUS AQUIFER	Glauconitic sand and interbedded clay and silt. Infrequently used as a water supply. Yields adequate for moderate supplies. Brackish in most of area. Artesian
CRETACEOUS	UPPER	LOWER CRETACEOUS	TRANSITIONAL BEDS	LOWER CRETACEOUS	Interbedded gravel, sand, silt, and clay. Yields are adequate for large industrial use. Brackish in most of area. Artesian
	LOWER		PATUXENT		



Environmental
Science &
Engineering

DATE
7-30-91

DRAWN BY
LAF

JOB NO.
4901162

SCALE
N/A

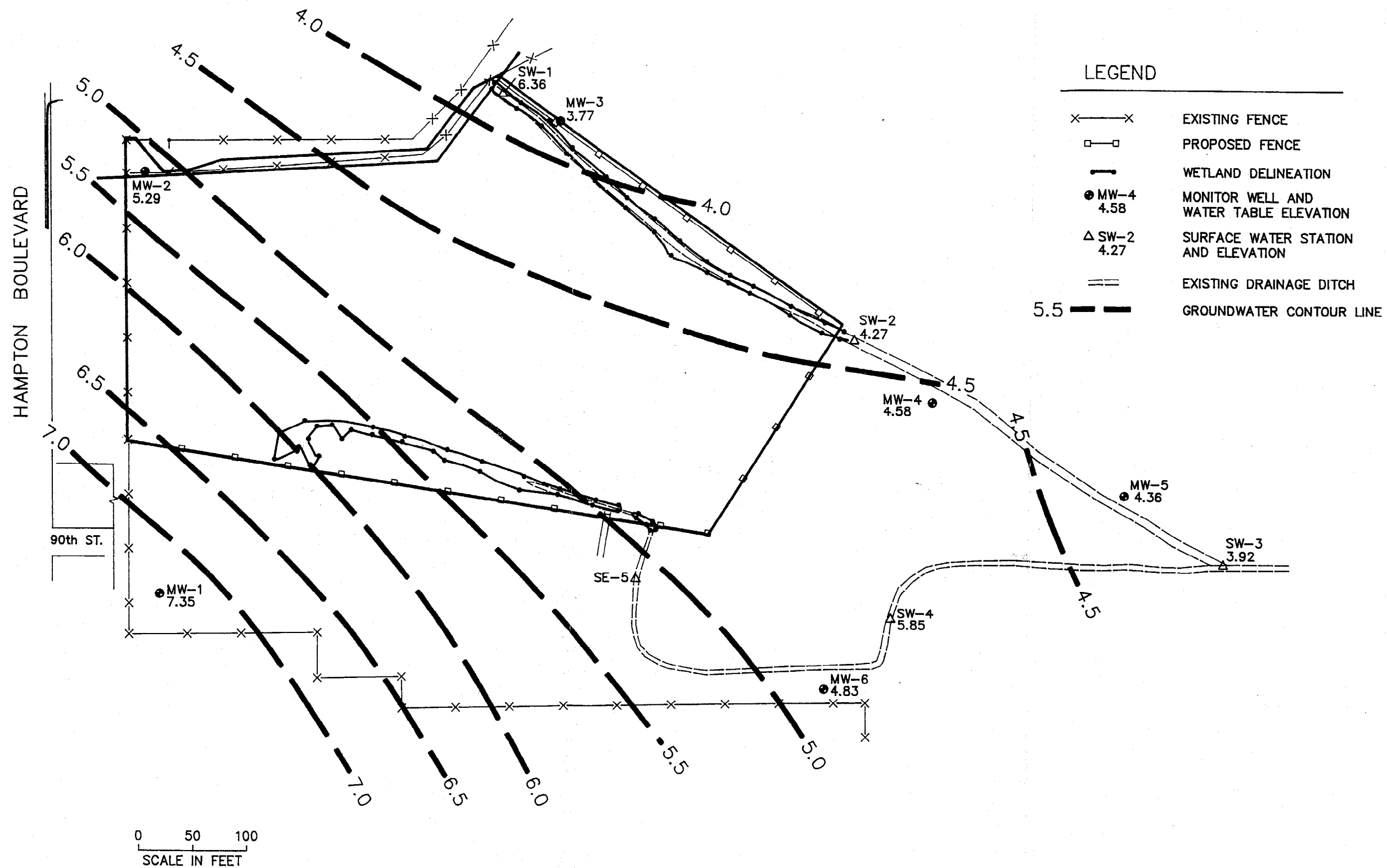
APPROVED BY

DWG. NO./ REV. NO.
Q3-1 / 1

TITLE
STRATIGRAPHIC AND HYDROGEOLOGIC
UNITS - SOUTHEASTERN VIRGINIA
(FROM SIUDYLA, ET AL., 1981)

CLIENT
LANTNAVFACENGCOM
CD LANDFILL


FIGURE
4-1



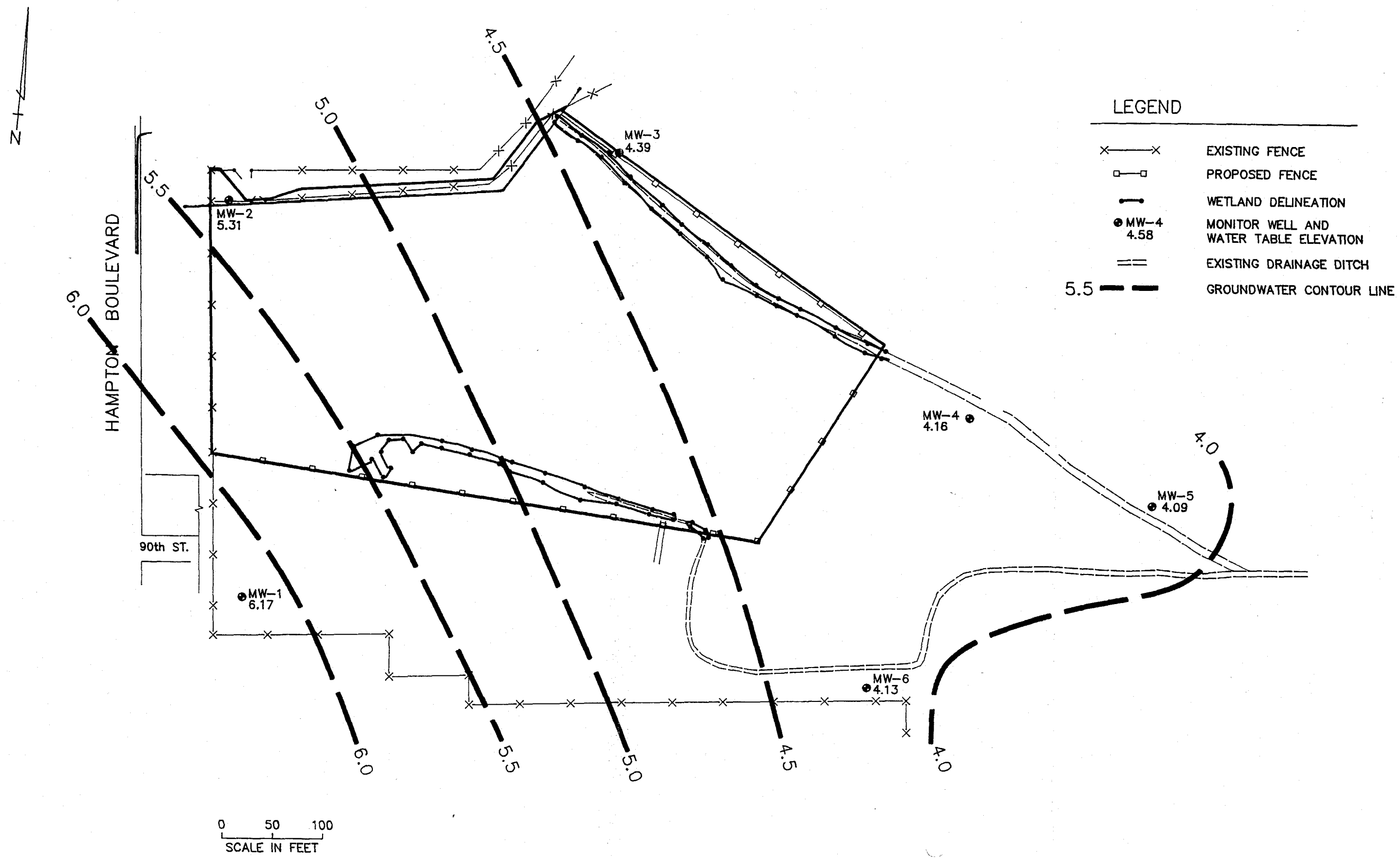
LEGEND

- EXISTING FENCE
- PROPOSED FENCE
- WETLAND DELINEATION
- MONITOR WELL AND WATER TABLE ELEVATION
- SURFACE WATER STATION AND ELEVATION
- EXISTING DRAINAGE DITCH
- GROUNDWATER CONTOUR LINE

0 50 100
SCALE IN FEET

 Environmental Science & Engineering	DATE 7-24-91	SCALE SHOWN	TITLE GROUNDWATER CONTOUR MAP (MARCH 11, 1991)	
	DRAWN BY LAF	APPROVED BY		
	JOB NO. 4901162	DWG. NO./ REV. NO. GW62A / -	CLIENT LANTNAVFACENGCOM CD LANDFILL	FIGURE 4-2

01270DB52



Environmental
Science &
Engineering

DATE 7-24-91	SCALE SHOWN	TITLE GROUNDWATER CONTOUR MAP (JUNE 12, 1991)	
DRAWN BY LAF	APPROVED BY		
JOB NO. 4901162	DWG. NO./ REV. NO. GW62B / -	CLIENT LANTNAVFACENGCOM CD LANDFILL	FIGURE 4-3

5.0 DEGREE OF CONTAMINATION

This section discusses the sampling and analytical results for each of the media sampled during the expanded SI. The analytical results for each media are compared with the data from background samples to accurately depict fluctuations in contaminant levels in those media under scrutiny. Two sampling events were performed to help characterize the contaminants at the site: Round 1 began on 20 February 1991 with surface water, groundwater, soil, and sediment sampling; and Round 2 was initiated on 10 June 1991 with surface water and groundwater sampling only.

Laboratory data validation and Quality Assurance/Quality Control (QA/QC) were performed by ESE's laboratory in Gainesville, Florida and reviewed by ESE's project team in Herndon, Virginia. Laboratory QA/QC data and full analytical data are presented in Appendix F.

5.1 Subsurface Soils

Round 1 sampling included collecting subsurface soil at two intervals from each monitor well location. The sample intervals were 0-2 feet (upper sample) and the last 2 feet of the vadose zone above the potentiometric water surface (lower sample). Subsurface soil samples were not collected during Round 2.

Individual samples are referred to by a four-digit code. The first two digits (e.g., S0) indicate that the sample came from one of the six soil borings; the third digit (e.g., 1) reflects the boring number; and the fourth digit (U or L) represents the sample collection depth. The "U" represents the upper sample depth, and "L" represents the lower sample depth. The soil sample locations are shown in Figure 3-1, and the soil analytical results are summarized in Table 5-1.

5.1.1 Selected Metals

Among the potential contaminants deposited in the landfill, cadmium, lead, and iron were selected for analysis. Cadmium was detected in 50 percent of the upper soil samples (S01U through S06U) collected during Round 1. The concentrations ranged from 0.4 milligrams/kilogram (mg/kg) in S02U to 28.4 mg/kg in S04U. Thirty-three percent of the samples collected in the lower interval had concentrations of cadmium, from 0.6 mg/kg in S04L to 0.7 mg/kg in S06L.

Lead was detected in all of the upper samples (S01U through S06U). Concentrations ranged from 10.7 mg/kg in S05U to 4140 mg/kg in S04U. However, only two samples in the lower interval detected lead: S06L with 43.3 mg/kg and S04L with 48.4 mg/kg.

Construction landfills are excellent sources of high concentration precipitated iron leachate in soils and groundwater. Iron concentrations detected in both sampling intervals in the six soil borings were well above the VWCB standard of 3 milligrams/kilogram (mg/kg); water from the majority of the water table aquifer exceeds the standard (Siudyla et al., 1981). The minimum and maximum concentrations detected were in S05L with 1,934 mg/kg and S04U with 142,293 mg/kg.

5.1.2 Total Organic Halogens (TOX)

TOX was analyzed at CD Landfill to indicate the presence of halogenic compounds detected in the soils. In the 12 soil samples collected during Round 1, TOX was detected at each interval; concentrations ranged from 3 $\mu\text{g/kg}$ in S01L to 78 $\mu\text{g/kg}$ in S04U. TOX concentrations were generally higher in the upper soil samples than the lower samples.

5.2 Sediment

During Round 1, five samples were collected in the drainage ditch that borders the site. The sampling locations found in Figure 3-1 are identified as SE-1 through SE-5. Samples were collected in the top 3 inches of the soft sediment in each location shown in

Figure 3-1. Sediment was not collected during Round 2; analytical results are included in Table 5-2.

5.2.1 Selected Metals

Each of the five samples have cadmium concentrations ranging from 0.5 mg/kg in SE-4 to 4.9 mg/kg in SE-5. Lead was also detected in each sample from 18.7 mg/kg in SE-4 to 145 mg/kg in SE-5. Similar to the soil samples, the iron content was fairly high due to iron leachate from the landfill. Concentrations range from 4860 mg/kg in SE-4 to 93,700 mg/kg in SE-3.

5.2.2 Total Organic Halogens (TOX)

TOX was detected in all the sediment samples ranging from 2 µg/kg in SE-1 to 1400 µg/kg in SE-3. SE-3 was collected at the confluence of the two drainage ditches, which may explain the significantly higher concentration.

5.2.3 Cadmium

Cadmium is a potential landfill contaminant that may have migrated offsite by erosional effects (e.g., air, runoff) or surface water transport. Cadmium detected in the five sediment samples ranged from 0.5 mg/kg in SE-4 to 4.9 mg/kg in SE-5. Cadmium was not detected above the instrument detection limit in any of the groundwater/surface water samples for both rounds.

5.3 Groundwater

Groundwater provides a means for contaminant transport and redistribution away from a contaminated source area, thus increasing the size of a contaminant plume. To determine the extent of contamination, two rounds of groundwater samples were collected: Round 1 on 20 February 1991, followed by Round 2 on 10 June 1991. Laboratory analyses were performed on both rounds for cadmium, groundwater quality,

and indicator parameters. The groundwater quality and indicator parameters were analyzed according to Phase I of the VDWM landfill closure requirements. Groundwater analytical results are summarized in Tables 5-3 and 5-5.

5.3.1 Groundwater Indicator Parameters

The following parameters were analyzed to indicate if groundwater is contaminated with pollutants leaching from the landfill: TOX, TOC, pH, and specific conductivity. Round 1 results for TOX ranged from below detection limits (BDL) in MW-3 to 4100 $\mu\text{g/l}$ in MW-5, with an average 879 mg/l. TOC ranged from 1.8 mg/l in MW-3 to 6.3 mg/l in MW-2, with an average 4.4 mg/l. The average laboratory pH for the first round of sampling was slightly acidic: 5.65. The specific conductivity ranged from 231 micromhos/centimeter ($\mu\text{mhos/cm}$) in MW-3 to 1300 $\mu\text{mhos/cm}$ in MW-4.

Round 2 results for TOX ranged from BDL in MW-6 to 97 $\mu\text{g/l}$ in MW-1, with an average 55.8 $\mu\text{g/l}$. TOC ranged from 4.1 mg/l in MW-3 to 15.7 mg/l in MW-2, with an average 9.7 mg/l. The average laboratory pH during this round was 5.7, and specific conductivity ranged from 322 $\mu\text{mhos/cm}$ in MW-3 to 1410 $\mu\text{mhos/cm}$ in MW-4.

5.3.2 Groundwater Quality Parameters

To determine if CD Landfill has contaminated groundwater beyond the solid waste boundary, the following quality parameters were analyzed: iron, lead, sodium, and hardness. To compare the total concentrations and dissolved concentrations of metals in the groundwater, filtered and unfiltered samples were collected during Round 1 only.

Round 1 analytical results for the filtered and unfiltered lead samples were both below the detection limit of 47 $\mu\text{g/l}$ in the six wells. Iron concentrations were significantly higher in the unfiltered samples, with ranges of 1458 $\mu\text{g/l}$ in MW-3 to 38,129 $\mu\text{g/l}$ in MW-5. In comparison, the filtered samples ranged from 12 $\mu\text{g/l}$ in MW-3 to 31,651 $\mu\text{g/l}$

in MW-5. The two parameters not filtered during this round were hardness and sodium. The average groundwater hardness across the site was 280 mg/l. Sodium concentrations ranged from 9.9 mg/l in MW-3 to 130 mg/l in MW-4, with an average 42 mg/l.

Groundwater samples during Round 2 of the sanitary program were not filtered. In comparison to the total lead and iron concentrations of Round 1, Round 2 concentrations increased approximately 2.5 times. Lead concentrations ranged from BDL in MW-3 to 128 $\mu\text{g/l}$ in MW-6. Iron was detected from 4070 $\mu\text{g/l}$ in MW-3 to 139,000 $\mu\text{g/l}$ in MW-4. Very little difference existed in sodium and hardness from Round 1 to Round 2. The average concentrations of Round 2 for hardness were 295 mg/l and 42.55 mg/l for sodium.

5.3.3 Cadmium

Cadmium was not detected in the groundwater samples collected in Round 1 or Round 2. The instrument detection limit for both rounds was 3 $\mu\text{g/l}$.

5.4 Surface Water

Surface water samples collected in Round 1 and Round 2 were identified as SW-1 through SW-5 and analyzed for cadmium, and water quality and indicator parameters. The drainage ditch sampling locations are shown on Figure 3-1. The sample locations were selected because the drainage ditch was determined to be a contaminant migration pathway during the IAS. Analytical results are found in Tables 5-4 and 5-6.

Water samples were not filtered prior to collection. Round 1 samples were collected in three of the five locations recommended. Samples SW-1 and SW-5 were not collected because the locations were dry; a second attempt to collect these samples also failed. However, additional samples were collected during the second attempt from SW-2, SW-3, and SW-4 for analysis of pH, specific conductivity, TOX, hardness, and TOC.

Only two of the five samples were collected during Round 2. Sample locations SW-1, SW-4, and SW-5 were dry. No second attempt was made to collect these samples.

5.4.1 Water Quality Parameters

Lead was the only analyte not detected in both sampling rounds. The detection limit for lead in the first round was 47 $\mu\text{g/l}$; the second round was 34.5 $\mu\text{g/l}$. The difference in the instrument detection limit is based on the amount of particulates in the sample: the more particulates, the higher the detection limit. In Round 1, a moderate to high iron concentration was detected in samples SW-2, SW-3, and SW-5, ranging from 250 $\mu\text{g/l}$ in SW-2 to 4330 $\mu\text{g/l}$ in SW-3. Round 2 iron concentrations ranged from 2650 $\mu\text{g/l}$ in SW-2 to 38,100 $\mu\text{g/l}$ in SW-3. The water hardness between the two rounds was comparatively the same: Round 1 ranged from 158 mg/l in SW-3 to 246 mg/l in SW-4, and Round 2 concentrations were 172 mg/l in SW-2 and 180 mg/l in SW-3.

5.4.2 Indicator Parameters

The surface water obtained at the site during both rounds of sampling were collected downgradient of the landfill. The water table aquifer in the Norfolk area is typically acidic (average 6.5-9). However, the surface water east of the landfill is basic with an average pH of 7.2 in Round 1 and a average pH of 7.5 in Round 2. Construction rubble (i.e., concrete) is believed to decrease water acidity.

The specific conductivity during both sampling rounds ranged from 327 $\mu\text{mhos/cm}$ in SW-4 to 905 $\mu\text{mhos/cm}$ in SW-2; Round 2 results were 320 $\mu\text{mhos/cm}$ in SW-2 and 409 $\mu\text{mhos/cm}$ in SW-2.

TOX during Round 1 was consistently higher than Round 2. Round 1 ranged from 340 $\mu\text{g/l}$ in SW-2 to 420 $\mu\text{g/l}$ in SW-4. In comparison, Round 2 results were 13 $\mu\text{g/l}$ in SW-2 and 84 $\mu\text{g/l}$ in SW-3. Round 1 TOC ranged from 5.6 mg/l in SW-3 to 7.9 mg/l in SW-4. Round 2 concentrations were 5.2 mg/l in SW-2 and 170 mg/l in SW-3.

5.4.3 Cadmium

Cadmium was not detected in the surface water samples in either sampling round. The instrument detection limit for both rounds was 3 $\mu\text{g/l}$.

5.5 Summaries of Media Contamination

5.5.1 Subsurface Soil

Moderate to high cadmium and lead concentrations were detected in the upper 2 feet at each sample location. The highest concentrations occurred in SO-4, located within the landfill inner boundaries. High lead levels were also detected in the lower sample intervals. Lower cadmium levels were detected in the lower level than in the upper 2 feet. Locations SO-4 and SO-6 were the only locations where cadmium and lead were detected at both intervals. These two areas may be considered point sources for offsite migratory contamination. The levels detected in the remaining upper samples may have been the result of offsite migration by groundwater transport or surface and wind erosion during landfill operations from 1974 to 1987.

Very weak relationships exist among the other contaminants analyzed in the subsoils at CD Landfill. The levels are extremely variable, and it is difficult to relate this data to determine point source soil contamination and make any corrections. There are no local, state, or Federal guidelines or standards to establish remedial recommendations for soils for the analyzed parameters.

5.5.2 Sediment

Sediment samples were collected only during the first round of sampling. Other than SE-5, cadmium and lead concentrations were minimal. The high concentrations at SE-5 are assumed to be due to the drainage ditch and sampling location within the landfill boundaries; this may be a result of wastes disposed of directly on the sampling location when the landfill was open. Contaminant transport downstream in the sediment is also confirmed by increasing concentrations of TOX, cadmium, iron, and lead in SE-1 than in SE-2, SE-3, or SE-5. Contaminant concentrations in SE-4 appear to be an anomaly,

being unexpectedly lower than SE-5. Sample SE-3 is somewhat elevated, presumably due to contaminants transported by the drainage ditches that converge at the sampling location. TOX data also confirms offsite contaminant transport because contaminants levels increase to the east, in the direction of surface water flow.

5.5.3 Groundwater

Analytical data indicate that cadmium was not detected in the monitor wells that encompass the site. Five of the six wells in Round 1 and four wells in Round 2 exceeded at least four VWCB groundwater quality and indicator parameter standards. All six wells exceeded at least three VWCB standards during both sampling rounds.

Lead was not detected in Round 1; however, four of the six samples (MW-2, MW-4, MW-5, and MW-6) collected during Round 2 exceeded the VWCB lead standard of 50 $\mu\text{g/l}$. A close relationship exists between the high soil contaminant levels in SO-4 and SO-6 and the high concentrations of lead in MW-4 and MW-6. It appears that the southeast portion of the site is leaching lead into the groundwater beyond the solid waste boundary.

Iron concentrations exceeded the VWCB guideline of 0.3 $\mu\text{g/l}$ in all sampling locations during both sampling rounds, except sample MW-3 for dissolved (filtered) solids. The high iron content can be correlated to the high iron content in the subsoils, thus precipitating iron into the groundwater. A weak relationship exists between the high iron levels in the water and the high iron levels in the soil, although both media are very high. The analytical data indicate that some wells with higher iron concentrations are associated with lower soil concentrations; the opposite also occurs. This phenomena may be indicative of greater iron leaching from the soil into groundwater in those wells with higher iron concentrations. An iron point source(s) is difficult to determine.

The acidic water that enters from the west becomes basic as it progresses through the landfill. Construction debris in landfills contains concrete, and the lime in the concrete breaks down and dissolves into the water, thus reducing acidity.

TOC in MW-2 and MW-4 exceeded the VWCB guideline of 10 mg/l in Round 2, although first round samples were below the guideline. Additional TOC monitoring is required to evaluate the full impact on groundwater.

Water hardness exceeded the VWCB guideline of 120 mg/l in all samples for both sampling rounds. The VWCB guideline of 100 mg/l for sodium was exceeded in MW-4 during both sampling rounds.

TOX was detected in both sampling rounds without any general migration trend or contaminant point source. There are no local, state, or Federal guidelines/standards for TOX. This parameter indicates that the groundwater quality is impacted by some type of organic halogen (e.g., volatiles, semivolatiles, pesticides).

5.5.4 Surface Water

VWCB proposed surface water standard amendments were exceeded for iron in both sampling rounds; cadmium and lead were not detected in the surface water in either sampling round. A comparison to sediment concentrations indicates that pollutants are migrating offsite through this media. Elevated concentrations of TOX, TOC, and iron increase eastward (downstream), and lead and cadmium concentrations in sediments also increase in this direction. However, no background samples were collected for comparison due to the lack of water at the time of sampling.

TABLE 5-1

Summary of Analytical Data for Soils (mg/kg)

CD-LANDFILL SITE INVESTI

Round 1, February 1991

S01U			S01L			S02U			S02L			S03U			S03L		
DETECTION LIMIT CONC.			DETECTION LIMIT CONC.			DETECTION LIMIT CONC.			DETECTION LIMIT CONC.			DETECTION LIMIT CONC.			DETECTION LIMIT CONC.		
MOISTURE	11.5		12.4		11.8		17.1		13.9		16.7						
TOX	19		3		21		44		23		10						
pH	6.7		6.8		6.4		6.6		6.9		5.0						
CADMIUM	0.3	BDL U	0.3	BDL U	0.3	0.4 B	0.3	BDL U	0.3	BDL U	0.3	BDL U	0.3	BDL U	0.3		
IRON	8062		4304		6592		2749		4155		4805						
LEAD	5.19	15.5	5.19	BDL U	5.22	11.8	5.22	BDL U	5.18	15.6	5.18	BDL U	5.19				
S04U			S04L			S05U			S05L			S06L			S06U		
DETECTION LIMIT CONC.			DETECTION LIMIT CONC.			DETECTION LIMIT CONC.			DETECTION LIMIT CONC.			DETECTION LIMIT CONC.			DETECTION LIMIT CONC.		
MOISTURE	24.2		25.2		7.7		14.4		17.1		15.1						
TOX	78		64		40		35		9		62						
pH	6.6		6.7		6.6		6.8		6.8		6.6						
CADMIUM	0.3	28.4	0.3	0.6	0.3	BDL U	0.3	BDL U	0.3	0.7	0.3	0.6					
IRON	142293		12202		2879		1934		10636		8907						
LEAD	5.2	4140	5.2	48.4	5.2	10.7	5.3	BDL U	5.3	43.3	5.3	56					

U - Analyte analyzed for but not detected

B - Detected above instrument detection limit
but below required detection limit

BDL - Below Detection Limit

TABLE 5-2

Summary of Analytical Data for Sediments (mg/kg)

CD-LANDFILL SITE INVESTIGATION

Round 1, March 1991

SAMPLE NO.	SE1	SE2	SE3	SE4	SE5
=====					
	DETECTION		DETECTION		DETECTION
COMPOUND	LIMIT	CONC.	LIMIT	CONC.	LIMIT

MOISTURE		16.1		67.5	
TOX (ug/kg)		2		440	
pH		7.5		6.8	
CADMIUM		0.6		1.4	
IRON		6930		56900	
LEAD		19.7		21.2	
				76.5	
				1400	
				6.5	
				6.9	
				0.5	
				4860	
				18.7	
					16.7
					40
					6.8
					4.9
					15600
					145

TABLE 5-3

Summary of Analytical Data for Groundwater (ug/l)

CD-LANDFILL SITE INVESTIGATION

Round 1, March 1991

SAMPLE NO.	MW-1		MW-1FD		MW-2		MW-3		MW-4		MW-5		MW-6		Federal	VWCB
	STANDARDS		STANDARDS		STANDARDS		STANDARDS		STANDARDS		STANDARDS		STANDARDS		STANDARDS	
COMPOUND	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	FEDERAL STANDARDS	VWCB STANDARDS
TOX	10	65	10	60	10	41	10	U	10	42	10	4100	10	150		
HARDNESS (mg/l)		318		314		192		144		532		204		291		120
TOC (mg/l)	1	2.2	1	2.2	1	6.3	1	1.8	1	4.6	1	4.3	1	4.9		10
FILTERED (DISSOLVED)																
IRON	12	23978	12	22606	12	2286	12	12 B	12	585	12	31651	12	12316	300 b	300
LEAD	47	BDL U	47	BDL U	47	BDL U	47	BDL U	47	BDL U	47	BDL U	47	BDL U	50 c	50
UNFILTERED (TOTAL)																
CADMIUM	3	BDL U	3	BDL U	3	BDL U	3	BDL U	3	BDL U	3	BDL U	3	BDL U	5 a	0.4
IRON	12	28804	12	27363	12	23660	12	1458	12	6011	12	38129	12	17470	300 b	300
LEAD	47	BDL U	47	BDL U	47	BDL U	47	BDL U	47	BDL U	47	BDL U	47	BDL U	50 c	50
SODIUM (mg/l)		22.7		22		41.7		9.9		130		28.4		20.5		100
pH		5.05		4.18		4.19		6.10		6.32		6.13		6.11	6.5/8.5 b	6.5/9
SPEC. COND. (umhos/cm)		789		740		552		231		1300		504		542		

U - Analyte analyzed for but not detected

B - Detected above instrument detection limit
but below required detection limit

BDL - Below Detection Limits

a - Maximum Contaminant Level (MCL)

b - Secondary Maximum Contaminant Level (SMCL)

c - Maximum Contaminant Limit Goal (MCLG)

TABLE 5-4

Summary of Analytical Data for Surface Water (ug/l)

CD-LANDFILL SITE INVESTIGATION

Round 1, March 1991

SAMPLE NO.	SW-1		SW-2		SW-3		SW-4		SW-5		FD		FEDERAL	VWCB
COMPOUND	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIM	CONC.	DETECTION LIMIT	CONC.	STANDARDS	STANDARDS
TOX	10	NA	10	340	10	360	10	420	10	NA	10	390		
HARDNESS (mg/l)		NA		221		158		246		NA		178		
TOC (mg/l)	1	NA	1	7.1	1	5.6	1	7.9	1	NA	1	BDL U		
CADMIUM	3	NA	3	BDL U	3	BDL U	3	BDL U	3	NA			5 a	10 d
IRON	12	NA	12	250	12	4330	12	2878	12	NA			300 b	1 e
LEAD	47	NA	47	BDL U	47	BDL U	47	BDL U	47	NA			50 c	50 d
SODIUM (mg/l)		NA		27.2		54.3		41.9		NA				
pH (LAB)		NA		7.3		7.2		7.2		NA		7.15		
SPEC. COND. (umhos/cm)		NA		905		494		327		NA		2.64		

U - Analyte analyzed for but not detected

BDL - Below Detection Limits

NA - Not Analyzed; no surface water present

a - Maximum Contaminant Level (MCL)

b - Secondary Maximum Contaminant Level (SMCL)

c - Maximum Contaminant Limit Goal (MCLG)

d - VWCB proposed amendments to surface water standards for protection of human health (public water supplies)

e - VWCB existing surface water standards for protection of aquatic life

TABLE 5-5

Summary of Analytical Data for Groundwater (ug/l)

CD-LANDFILL SITE INVESTIGATION

Round 2, June 1991

SAMPLE NO.	MW-1		MW-1FD		MW-2		MW-3		MW-4		MW-5		MW-6			
COMPOUND	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	FEDERAL STANDARDS	VWCB STANDARDS
TOX	10	97	10	49	10	33	10	59	10	39	10	51	10	BDL U		
HARDNESS (mg/l)		328		328		208		132		596		220		288		120
TOC (mg/l)	1	5.1	1	4.1	1	15.7	1	4.7	1	14.1	1	9.7	1	9.3		10
Unfiltered (TOTAL)																
CADMIUM	3	BDL U	3	BDL U	3	BDL U	3	BDL U	3	BDL U	3	BDL U	3	BDL U	5 a	0.4
IRON	12	46200	12	57800	12	47500	12	4070	12	139000	12	98600	12	105000	300 b	300
LEAD	34.5	45.1	34.5	39	34.5	60.7	34.5	BDL U	34.5	113	34.5	52.8	34.5	128	50 c	50
SODIUM (mg/l)		23.7		24.6		42.3		10		128		29.1		22.2		100
pH		4.37		4.39		5.18		6.19		6.51		6.21		6.13	6.5/8.5 b	6.5/9
Spec. Cond. (umhos/cm)		927		918		641		322		1410		573		607		

U - Analyte analyzed for but not detected

BDL - Below Detection Limits

a - Maximum Contaminant Level (MCL)

b - Secondary Maximum Contaminant Level (SMCL)

c - Maximum Contaminant Limit Goal (MCLG)

TABLE 5-6

Summary of Analytical Data for Surface Water (ug/l)

CD-LANDFILL SITE INVESTIGATION

Round 2, June 1991

SAMPLE NO.	SW-1		SW-2		SW-3		SW-4		SW-5		FD			
COMPOUND	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	DETECTION LIMIT	CONC.	FEDARAL STANDARD	VWCB STANDARD
TOX	10	NA	10	13	10	84	10	NA	10	NA	10	390		
HARDNESS (mg/l)		NA		172		180		NA		NA		178		
TOC (mg/l)	1	NA	1	5.2	1	7	1	NA	1	NA	1	1		
CADMIUM	3	NA	3	BDL U	3	BDL U	3	NA	3	NA				
IRON		NA		2650		38100		NA		NA				
LEAD	34.5	NA	34.5	BDL U	34.5	BDL U	34.5	NA	34.5	NA			50 c	50 d
SODIUM (mg/l)		NA		15.3		24		NA		NA				
pH (LAB)		NA		7.88		7.17		NA		NA		7.15		
Spec. Cond. (umhos/cm)		NA		320		409		NA		NA				

U - Analyte analyzed for but not detected

NA- Not Applicable; no surface water present

BDL - Below Detection Limits

a - Maximum Contaminant Level (MCL)

b - Secondary Maximum Contaminant Level (SMCL)

c - Maximum Contaminant Limit Goal (MCLG)

d - VWCB proposed amendments to surface water standards for protection of human health (public water supplies)

e - VWCB existing surface water standards for protection of aquatic life

TABLE 5-7

Summary of Analytical Data for QC Samples (ug/l)

CD-LANDFILL SITE INVESTIGATION

Round 1	03/12/91	03/11/91	03/12/91	02/22/91	02/22/91
SAMPLE NO.	WATER FLD BLK	WATER EQU BLK	WATER EQU BLK	SOIL FLD BLK	SOIL EQU BLK
COMPOUND	DETECTION LIMIT CONC.	DETECTION LIMIT CONC.	DETECTION LIMIT CONC.	DETECTION LIMIT CONC.	DETECTION LIMIT CONC.
TOX	10 BDL U	10 16	10 11	10 BDL U	10 BDL U
HARDNESS (mg/l)	4	2	4		
TOC	1 1.1	1 BDL U	1 1.3		
CADMIUM	3 BDL U	3 BDL U	3 BDL U		
IRON	12 27.6 B	12 BDL U	12 18.1 B		
LEAD	47 BDL U	47 BDL U	47 BDL U		
TOTAL					
CADMIUM	3 BDL U	3 BDL U	3 BDL U	3 BDL U	3 BDL U
IRON	12 27.8 B	12 58 B	12 215	12 45	12 108
LEAD	47 BDL U	47 BDL U	47 BDL U	47 BDL U	47 BDL U
SODIUM	0.3 B	0.2 B	0.2 B		
pH	6.21	5.45	5.83	5.45	5.39
SPEC. COND. (umhos/cm)	<10	<10	<10	<10	<10

U - Analyte analyzed for but not detected

B - Detected above Instrument detection limit
but below required detection limit

BDL - Below Detection Limit

TABLE 5-8

Summary of Analytical Data for QC Samples (ug/l)

CD-LANDFILL SITE INVESTIGATION

Round 2	6/12/91		06/12/91		06/12/91	
	WATER		WATER		WATER	
SAMPLE NO.	FLD BLK		EQU BLK		EQU BLK	
=====						
COMPOUND	DETECTION		DETECTION		DETECTION	
	LIMIT	CONC.	LIMIT	CONC.	LIMIT	CONC.

TOX	10	BDL U	10	10	10	BDL U
HARDNESS (mg/l)		BDL U		BDL U		BDL U
TOC (mg/l)	1	BDL U	1	BDL U	1	BDL U
LEAD	47	BDL U	47	BDL U	47	BDL U
Unfiltered (TOTAL)						
CADMIUM	3	BDL U	3	BDL U	3	BDL U
IRON	12	13.5	6.2	BDL U	12	8.4 B
LEAD	34.5	BDL U	34.5	BDL U	47	BDL U
SODIUM		0.264		0.483 B		0.494 B
pH		6.24		6.48		6.17
Sp Cond		<10		<10		<10

U - Analyte analyzed for but not detected

B - Detected above Instrument detection limit
but below required detection limit

BDL - Below Detection Limits

6.0 SUMMARY AND CONCLUSIONS

6.1 Summary

6.1.1 Degree of Contamination

Analyses of soil (SO-4 and SO-6), groundwater (Round 2: MW-4, MW-5, and MW-6), sediment (SE-2, SE-3, and SE-5), and surface water (SW-2, SW-3, and SW-4) indicate the southeastern portion (1974-1979 operation) is impacting the four media more than the northwestern portion of the landfill (1979-1987 operation). Specifically, analysis of the subsurface soil and sediment samples suggest that cadmium and lead contamination are beyond the solid waste boundary (drainage ditch). These metals are fairly immobile in the solid form; however, lead appears to be dissolved in the groundwater in the southeast portion of the site. Once dissolved in the groundwater, mobilization increases.

6.1.1.1 Sediment

During this investigation, iron, lead, TOX, and cadmium were detected in the sediment samples. With the exception of SE-5, the greatest concentrations gradually increased to the east. The high level in SE-5 is assumed to be the result of the sample location being within the boundaries of the landfill. Although there are no standards or guidelines for TOX in sediment, low (2 parts per billion (ppb)) to high (1400 ppb) concentrations were widespread in the drainage ditch. In addition, extremely high concentrations of iron were also detected.

6.1.1.2 Subsurface Soil

High concentrations of cadmium, iron, and lead appear to be widespread across the site, and TOX was also detected at moderate concentrations. Although cadmium, iron, and lead concentrations are high in their present condition, mobility is extremely low. Guidance or requirements for remedial action for these contaminants in soils do not exist.

6.1.1.3 Groundwater

Lead concentrations in groundwater samples from MW-2, MW-4, MW-5, and MW-6 exceeded the VWCB standard (Round 2); sodium was exceeded in MW-4; TOC was exceeded in MW-2 and MW-4 (Round 2); and iron was exceeded in all samples during both rounds. Although TOX was detected in all samples, no TOX guidelines or standards exist for groundwater.

6.1.1.4 Surface Water

Cadmium and lead were not detected in surface water; however, a comparison to sediment concentrations indicates that pollutants are migrating offsite through this media. The concentration of iron detected in the media exceeded the VWCB standards. Because no background samples were collected, comparisons cannot be made regarding elevated concentrations of TOX, TOC, and iron.

The nature and extent of all detected parameters remain inconclusive. A weak correlation can be made between high soil and groundwater concentrations directly below the soil "hot spots." Additional information (soil borings, monitor wells, and geophysical surveys) will be required to fulfill the requirements for an RI/FS.

6.2 Data Limitations

The purpose of the expanded SI is to identify which landfill wastes, if any, impact sediment, surface water, soil, and groundwater. During this investigation, analyses revealed that groundwater quality in the uppermost aquifer is impacted. To fulfill an RI/FS or closure requirements, the following data limitations will need to be addressed for each of the following three categories:

- Unpermitted Landfill Closure
 - Actual boundaries of the permitted landfill are unclear, especially the boundary with the unpermitted portion.

- Contaminant sources were not identified or recorded during the life of the landfill.
- Quarterly groundwater sampling and analysis of six monitor wells has not been completed to determine the facility's full impact on groundwater quality.
- A closure plan, separate from the unpermitted landfill, has not been prepared or submitted.
- Permitted Landfill Closure
 - Actual boundaries of the permitted landfill are unclear, especially the interface with the unpermitted portion.
 - Contaminant sources were not identified and recorded during landfill operation.
 - Groundwater monitor wells are not installed around the perimeter of the permitted landfill as described in the closure requirements (if ESE interprets landfill boundaries correctly).
 - Quarterly groundwater sampling and analysis of above wells has not been initiated to determine the facility's impact on groundwater quality.
- RI/FS
 - Actual extent of solid waste burial is unclear; contaminant source areas have not been defined.
 - Various media have been impacted by landfill operations, but the full extent of contamination has not been delineated (both onsite and offsite).

- The full range of possible contaminants has not been investigated.
- Risk to human health and the environment has not been determined.

6.3 Data Requirements

A series of data gaps were encountered to comply with the requirements for landfill closure or in initiating an RI/FS. For simplicity, data limitations were broken down into three areas:

- Unpermitted Landfill
 - Identify actual boundaries of the permitted landfill.
 - Identify individual solid waste burial cells (e.g., asbestos versus sandblasting grit).
 - Continue monitoring for the two remaining quarters to complete one-year period required by Phase I requirements of the Solid Waste Management Regulations (SWMR).
 - Prepare and submit a separate closure plan.
- Permitted Landfill
 - Identify actual boundaries of the permitted landfill.
 - Identify individual solid waste burial cells.
 - Install upgradient and downgradient wells around perimeter of the 5-acre landfill.

- Institute quarterly sampling of perimeter wells according to Part V of the SWMR for landfill closure.
- Prepare and submit a separate closure plan.
- RI/FS
 - Identify solid waste burial boundaries (entire site) and contaminant point sources/burial cells.
 - Identify extent of known contamination in various media, both onsite and offsite (e.g., cadmium, lead, TOX), as well as the relationship between soil and groundwater contamination.
 - Identify potentially additional contaminants in various media (e.g., asbestos, semivolatiles, pesticides/herbicides, all TAL metals).
 - Determine potential human and environmental receptors and potential risk to human health and the environment, as well as to construction workers.

6.4 Recommendations for Future Work

The following recommendations were divided into three parts. The first and second parts describe what will be needed to complete closure requirements for the unpermitted and permitted landfill areas. The final recommendation lists the missing field and analytical information to begin completing an RI/FS.

1) Unpermitted Landfill

- Conduct geophysical survey to identify boundaries of entire landfill operation, as well as distinguish between permitted and unpermitted landfills and individual burial cells.

- Combination of magnetometer and EM-31 will identify heavy metal concentrations in soils and groundwater, and may also delineate solid waste burial boundaries.
- To conduct the geophysical survey, the site should be placed on a 20-ft² grid pattern, and data should be collected on 20-foot centers. Figure 6-1 illustrates the recommended area to be investigated.
- Continue quarterly sampling and analysis of groundwater samples from the existing monitor wells.
 - Analyze for water quality and indicator parameters according to the Phase I requirements of the SWMR.
- After the first year of groundwater monitoring, the mean and variance of contaminants detected in the background well should be calculated and compared to the contaminants in the downgradient wells. If the groundwater was significantly impacted by the landfill, Phase II described in Part V of the Virginia SWMR must be implemented.
- Prepare and submit a closure plan that the two landfills (permitted and unpermitted) as separate entities.

2) Permitted Landfill

- Conduct geophysical survey to identify boundaries of entire landfill operation, as well as distinguish between permitted and unpermitted landfills and individual burial cells.
 - Combination of magnetometer and EM-31 will identify heavy metal concentrations in soils and groundwater, and may also delineate solid waste burial boundaries.

- To conduct the geophysical survey, the site should be placed on a 20-ft² grid pattern, and data should be collected on 20-foot centers. Figure 6-1 illustrates the area to be investigated.
- Install a minimum of three downgradient wells and one upgradient (background) well.
 - Geophysical survey will assist in locating monitor wells and soil borings outside permitted landfill boundaries.
- Conduct a quarterly sampling and analysis of groundwater samples from the above wells.
 - Analyze for water quality and indicator parameters according to Phase I requirements of the SWMR.

3) RI/FS

- Conduct geophysical survey to identify boundaries of entire landfill operation, as well as distinguish between permitted and unpermitted landfills and individual burial cells.
 - Combination of magnetometer and EM-31 will identify heavy metal concentrations in soils and groundwater, and may also delineate solid waste burial boundaries.
 - Historical records do not delineate the landfill boundaries. By visual evidence during the SI, construction debris was noted outside the drainage ditch. Analytical data from the soil borings confirms offsite contamination. It has not been confirmed that the existing soil mounds noted in the confirmation study separate the two facilities.

- Install monitor wells, and sample surface soil borings and subsurface soil borings to determine the degree and extent of onsite and offsite contamination in soils and groundwater.
 - Surface water and sediment samples should be collected to fully determine the extent of contamination along the migration pathway (drainage ditch).
 - Geophysical survey will assist in locating surface soil borings and monitor wells to determine the full extent of onsite/offsite contamination.
 - Confirm the geophysical survey by installing groundwater monitor wells and soil borings. Soil samples will be collected continuously to 10 feet for laboratory analysis. Additional samples will be taken every 5 feet to the limit of each boring for soil descriptions. The monitor wells will be installed to approximately 35 feet, unless a confining layer is encountered. If so, the boring will not be advanced further to avoid contaminating the lower aquifer. Soil and groundwater samples will be analyzed for TAL metals, pesticides/ herbicides, semivolatiles, and asbestos.
 - Surface soil and groundwater will be analyzed for additional suspected contaminants (e.g., asbestos, TCL, semivolatiles, pesticides/herbicides, TAL metals).
 - Historical records indicate that large quantities of asbestos and semivolatile constituents (e.g., 500 five-gallon containers of petroleum waste by-products) were deposited in the landfill, and plastic packages of pesticides were present during field activities. TAL metal analysis should also be performed due to the sandblasting grit, fly ash, and other inert wastes may contain constituents not analyzed in previous investigations.

- Following completion of onsite investigation, perform risk assessment to determine the potential risk to human health and the environment (baseline risk assessment), as well as to workers performing any construction.

HAMPTON BOULEVARD

NAVY EXCHANGE WAREHOUSE

ACCESS ROAD

ACCESS ROAD

SECURITY FENCE

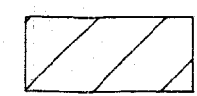
PASS OFFICE

C AND P
TELEPHONE
COMPANY

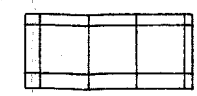
SECURED PARKING AREA



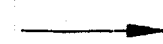
LEGEND



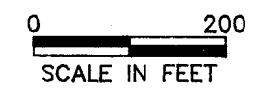
RECOMMENDED GEOPHYSICAL
SURVEY TO IDENTIFY SOLID
WASTE BOUNDARIES AND
CONTAMINATE POINT
SOURCES



ADDITIONAL GEOPHYSICAL
SURVEY IF SOLID WASTE
BOUNDARIES ARE NOT
IDENTIFIED



DRAINAGE DITCH AROUND
LANDFILL



Environmental
Science &
Engineering

DATE 8-1-91	SCALE 1"=200'	TITLE GEOPHYSICAL SURVEY MAP
DRAWN BY LAF	APPROVED BY	
JOB NO. 4901162	DWG. NO./ REV. NO. GEO62 / -	CLIENT LANTNAVFACENGCOM CD LANDFILL
		FIGURE 6-1

01270D06Z

REFERENCES

- Federal Interagency Committee for Wetland Delineation (FICWD), 1989, Federal Manual for Identifying and Delineating Jurisdictional Wetlands. US Government Printing Office, Washington, DC
- Reed, P.B., 1988, National List of Plant Species That Occur in Wetlands: Northeast (Region 1), US Government Printing Office, Washington, DC
- Soil Conservation Service (SCS), 1987, Hydric Soils of the United States, US Government Printing Office, Washington DC
- United States Department of Agriculture (USDA), 1951, Soil Survey Manual, Agricultural Handbook 18, US Government Printing Office, Washington, DC
- USDA, 1975, Soil Taxonomy, Agricultural Handbook 436, US Government Printing Office, Washington, DC
- United States Geological Survey (USGS)
- Commonwealth of Virginia Department of Waste Management, 1988, Solid Waste Management Regulations. VR 672-20-10
- Siudyla, E.A., May A.E., Hawthorne, D.W., 1981, Groundwater Resources of the Four Cities Area, Virginia, Virginia Water Control Board, Planning Bulletin 331
- Naval Facilities Engineering Command, 1987, Confirmation Study, Swells Point Naval Complex, CD Landfill

APPENDIX A

Analytical Results from the Confirmation Study



CENTEC ANALYTICAL SERVICES, INC.
A SUBSIDIARY OF THE CENTEC CORPORATION

P. O. BOX 956
2160 INDUSTRIAL DRIVE
SALEM, VIRGINIA 24153
(703) 387-3995

— ANALYTICAL RESULTS REPORT —

Mr. David Goodwin
Atlantic Division Code 1143
Naval Facilities Engineering Command
Norfolk, VA 23411

Re: Soil Analysis
CAS Commission No. 6094

REPORT DATE/NUMBER: 16 February 1983/35

SAMPLES COLLECTED: 26 January 1983

BY: Navy personnel

SAMPLES RECEIVED IN LAB: 28 January 1983: 0900

ANALYSIS FOR: Moisture %, and Cadmium (Cd)

METHOD OF ANALYSIS: Re: EPA SW-846, Test Methods for
Evaluating Solids Waste, May 1980

Results are on the following page.

If you have any questions or comments concerning this report,
please do not hesitate to contact us.

Prepared by:

CENTEC ANALYTICAL SERVICES

David F. Tompkins
Chemist

DFT/mls

Appendix A

Naval Facilities Engineering Command
16 February 1983
Page 2

CAS No.	Description	% Moisture	Cd ($\mu\text{g/g}$) (wet wt)	Cd ($\mu\text{g/g}$) (dry wt)
28420	CD Landfill upstream, Point 1 about 10 yds South of "Navy POL pipeline" sign, not pre-acidified #1 Sediment Collected 1025	60	1.46	2.43
28421	CD Landfill downstream, Point 2 North Branch of Creek n 25 yds above confluence w/South Branch Not pre-acidified #2 Sediment Collected 1045	67	6.46	9.64
28422	CD Landfill downstream, Point 3 South Branch of Creek n 25 yds above confluence w/North Branch Sample not pre-acidified #3 Sediment Collected 1055	50	1.46	2.92

RTK



— ANALYTICAL RESULTS REPORT —

Mr. David Goodwin
Atlantic Division Code 1143
Naval Facilities Engineering Command
Norfolk, VA 23411

Re: Water Analysis
CAS Commission No. 6094

REPORT DATE/NUMBER: 17 February 1983/36

SAMPLES COLLECTED: 26 January 1983

BY: Navy personnel

SAMPLES RECEIVED IN LAB: 28 January 1983: 0900

ANALYSIS FOR: Cadmium (Cd) Total


METHOD OF ANALYSIS: Re: Federal Register, Vol. 41, No. 232
1 December 1976

CAS No.	Description	Cd (mg/l)
28423	CD Landfill, upstream, Pt 1 about 10 yds South of "Navy POL Pipeline" sign Sample not pre-acidified Sample #1 Collected 1025	<0.01
28424	CD Landfill downstream, Pt 2 North Branch of creek n 25 yds above confluence w/South Branch, Not pre-acidified Sample #2 C. 1045	0.01
28425	CD Landfill downstream Pt 3 South Branch of Creek n 25 yds above confluence w/North Branch Sample #3 Collected 1055	<0.01

If you have any questions or comments concerning this report, please do not hesitate to contact us.

Prepared by:

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David F. Tompkins
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— ANALYTICAL RESULTS REPORT —

Mr. David Goodwin
Atlantic Division Code 1143
Naval Facilities Engineering Command
Norfolk, VA 23411

Re: Sediment Analysis
CAS Commission No. 6094

REPORT DATE/NUMBER: 12 May 1983/70

SAMPLES COLLECTED: 29 April 1983: 0907, 0920, 0912, 0917

BY: Navy personnel

SAMPLES RECEIVED AT LAB: 01 May 1983: 0800

ANALYSIS FOR: % Moisture and Cadmium (Cd)

METHOD OF ANALYSIS: Re: Federal Register, Vol. 44, No. 233
03 December 1979

CAS No.	Description	% Moisture	Cd (µg/g) (dry wgt)
29533	CD Landfill North Branch of Creek	63.5	9.37
29534	CD Landfill South Branch	57.6	4.88

If you have any questions or comments concerning this report,
please do not hesitate to contact us.

Prepared by:

CENTEC ANALYTICAL SERVICES

John C. Johnson
Chemist

JCJ/mls



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— ANALYTICAL RESULTS REPORT —

Mr. David Goodwin
Atlantic Division Code 1143
Naval Facilities Engineering Command
Norfolk, VA 23411

Re: Water Analysis
CAS Commission No. 6094

REPORT DATE/NUMBER: 12 May 1983/71

SAMPLES COLLECTED: 29 April 1983: 0912, 0917

BY: Navy personnel

SAMPLES RECEIVED AT LAB: 01 May 1983: 0800

ANALYSIS FOR: Cadmium (Cd)

METHOD OF ANALYSIS: Re: Federal Register, Vol. 41, No. 232,
1 December 1976.

CAS No.	Description	Cd (mg/l)
29535	CD Landfill North Branch of Creek	0.02
29536	CD Landfill South Branch of Creek	0.01

If you have any questions or comments concerning this report,
please do not hesitate to contact us.

Prepared by:

CENTEC ANALYTICAL SERVICES

John C. Johnson

John C. Johnson
Chemist

JCJ/mls



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— ANALYTICAL RESULTS REPORT —

Mr. David Goodwin
Atlantic Division Code 1143
Naval Facilities Engineering Command
Norfolk, VA 23511

Re: Sediment Analysis
CAS Commission No. 6094

REPORT DATE/NUMBER: 26 July 1983/110

SAMPLE COLLECTED: 07 July 1983: 1320 & 1327

BY: Wallmeyer, Miller

SAMPLE RECEIVED AT LAB: 09 July 1983: 1300

ANALYSIS FOR: Moisture and Cadmium (Cd)

METHOD OF ANALYSIS: Re: Federal Register, Vol. 41, No. 232,
1 December 1976

CAS No.	Description	% Moisture	Cd ($\mu\text{g/g}$) (dry wt basis)
---------	-------------	------------	--

30752	North Branch of Creek CD Landfill #681
-------	---

52.0

9.85

30753	South Branch of Creek CD Landfill
-------	--------------------------------------

46.5

14.3

If you have any questions or comments concerning this report,
please do not hesitate to contact us.

Prepared by:

CENTEC ANALYTICAL SERVICES

David F. Tompkins
Chemist

DFT/mls

Enclosure (1)



CENTEC ANALYTICAL SERVICES, INC.
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(703) 387-3995

— ANALYTICAL RESULTS REPORT —

Mr. David Goodwin
Atlantic Division Code 1143
Naval Facilities Engineering Command
Norfolk, VA 23511

Re: Water/Silt Analysis
CAS Commission No. 6094

REPORT DATE/NUMBER: 17 November 1983/176

SAMPLES COLLECTED: 31 October 1983: 1300

BY: H.W. Miller

SAMPLES RECEIVED IN LAB: 11 November 1983: 1600

ANALYSIS FOR: Moisture (%) and Cadmium (Cd)

METHOD OF ANALYSIS: Re: Federal Register, Vol. 41, No. 232,
1 December 1976

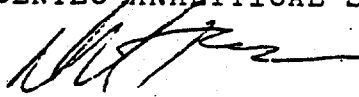
CAS No.	Description	Moisture (%)	Cd (mg/l)	Cd (µg/g)
32664	From North branch of creek @ CD area landfill #3304-1	86.6		115*
32265	From North branch of creek @ CD area landfill #3304-2		<0.01	
32666	From South branch of creek @ CD area landfill #3304-3	32.4		0.71*
32667	From South branch of creek @ CD area landfill #3309-4		<0.01	

* Dry weight basis.

If you have any questions or comments concerning this report,
please do not hesitate to contact us.

Prepared by:

CENTEC ANALYTICAL SERVICES


David F. Tompkins
Chemist

DFT/mls

ENCLOSURE (1)



CENTEC ANALYTICAL SERVICES, INC.
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— ANALYTICAL RESULTS REPORT —

Mr. David Goodwin
Atlantic Division Code 1143
Naval Facilities Engineering Command
Norfolk, Virginia 23511

Re: Water/Sediment Analysis
CAS Commission No. 6094

REPORT DATE/NUMBER: 25 April 1984/245

SAMPLES COLLECTED: 13 April 1984: 0943

BY: H.W. Miller

SAMPLES RECEIVED IN LAB: 19 April 1984: 1130

ANALYSIS FOR: % Moisture and Cadmium (Cd)

METHOD OF ANALYSIS: Re: Federal Register, Vol. 41, No. 232,
1 December 1976; EPA SW-846, Test
Methods for Evaluating Solid Wastes
May 1980

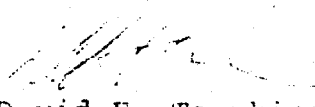
CAS No.	Description	Moisture (%)	Cd (µg/g)	Cd (mg/l)
37551	CD Landfill Sediment South Branch of Creek PWC Sample 4104-3	37.2	1.24*	
37552	CD Landfill water South Branch PWC Sample 4104-4			0.02
37553	CD Area Landfill Sediment North Branch of Creek PWC Sample 4104-1	47.0	8.17*	
37554	CD Area Landfill Water North Branch of Creek PWC Sample 4104-2			0.02

* Dry Weight Basis

If you have any questions or comments concerning this report,
please do not hesitate to contact us.

Prepared by:

CENTEC ANALYTICAL SERVICES, INC.


David F. Tompkins
Chemist

DFT/mls



CENTEC ANALYTICAL SERVICES, INC.
A SUBSIDIARY OF THE CENTEC CORPORATION

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(703) 387-3995

— ANALYTICAL RESULTS REPORT —

Mr. David Goodwin
Atlantic Division, Code 1143
Naval Facilities Engineering
Command
Norfolk, Virginia 23511

RE: Soil Analysis
CAS Commission No. 6094

REPORT DATE/NUMBER: 17 December 1984/358

SAMPLES COLLECTED: 31 October 1984: 0940: 0945

BY: U. S. Navy Personnel

SAMPLES RECEIVED IN LAB: 06 November 1984: 0830

ANALYSIS FOR: Percent Moisture and Total Cadmium (Cd)

METHOD OF ANALYSIS: ASTM; E203-64, 1973 Book of ASTM Standards
EPA SW-846 Test Methods for Evaluating Solid Wastes,
May 1980

CAS No.	Description	% Moisture	Cd (µg/g*)
42517	Sample #4305-1	31.2	7.46
42518	Sample #4305-2	50.3	26.4

* Dry Weight Basis

Should you have any questions or comments concerning this Report, please advise.

Prepared by:

CENTEC ANALYTICAL SERVICES

Cheryl M. Daniel, Laboratory Manager

CMD;dlf

Enclosure(1)

JTC Environmental Consultants, Inc.

Location: PWC - Norfolk Date of Receipt: 12-2-85 Turnaround: routine
Date: 1-2-86 Report No. 188 to Naval Facilities Engineering Command, Norfolk, Virginia
JTC Data Report No. 86-004 Table 3

[illegible]

APPENDIX B

Dedicated Soil Boring Log Sheets

BORING LOG

PAGE 1 OF 6

PROJECT NO: 4901162 FILE NO: 0793-1 log

BORING NO: MW-1

PROJECT NAME: CD Landfill

DATE BEGAN: 2/25/91

DATE FINISHED: 2/25/91

FIELD GEOLOGIST: M. Skrobacz

DRILLER: George Smith

NORTH: N/A

EAST: N/A

GROUND SURFACE ELEV. : 14.98 feet

GWL DATE/TIME: 2/25/91

GWL DEPTH: 7.0 feet



DRILLING METHOD: 6-1/4" ID Hollow-stem auger

DRILL EQUIP: ATV

GWL EQUIP: ORS

CONTRACTOR: Hardin-Huber

CHECKED BY: N/A

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	P R O F I L E	DESCRIPTION	USCS	VOLATILE ORGANIC VAPORS (ppm)		REMARKS
								FID	PID	
	0.00	SS1	1-7			TOPSOIL	SM			Groundwater @ 7' Soil becomes grey @ 7.5'
			9-8			SILTY SAND: Yellow-brown SAND with silt; moist.				
10.0	-5.00	SS2	5-6							
			8-7							
		SS3	3-3							
			6-6							
5.0	-10.00									
		SS4	0-0							
			4-10							
0.0	-15.00									
		SS5	4-10							
			3-3							
5.0	-20.00					CLAY: Dark grey CLAY, plastic, wet.	CH			Clay content increases @ 20' Soil is dark grey @ 19-20' Bottom of boring @ 23.5'
		SS6	3-3							

BORING LOG

PAGE 2 OF 6

PROJECT NO: 4901162 FILE NO: 0793-2. log

BORING NO: MW-2

PROJECT NAME: CD Landfill

DATE BEGAN: 2/25/91

DATE FINISHED: 2/25/91

FIELD GEOLOGIST: M. Skrobacz

DRILLER: George Smith

NORTH: N/A

EAST: N/A

GROUND SURFACE ELEV.: 12.16 feet

GWL DATE/TIME: 2/25/91

GWL DEPTH: 5.0 feet



DRILLING METHOD: 6-1/4" ID Hollow-stem auger

DRILL EQUIP: ATV

GWL EQUIP: ORS

CONTRACTOR: Hardin-Huber

CHECKED BY: N/A

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	P R O F I L E	DESCRIPTION	U S C S	VOLATILE ORGANIC VAPORS (ppm)		REMARKS
								FID	PID	
	0.00	SS1	4-7			TOPSOIL	SM			Groundwater @ 5' Soil becomes grey @ 8'
			4-7			SILTY SAND: Yellow-brown SAND with silt; moist; trace gravel				
10.0										
▼ -5.00		SS2	7-3							
			7-3							
5.0										
		SS3	3-3							
			3-3							
-10.00										
0.0										
		SS4	8-11							
			16-16							
-15.00										
5.0										
		SS5	1-3							
			4-4							
-20.00						CLAY: Dark grey CLAY, plastic; wet.	CH			Organics present at sand-clay interface Bottom of boring @ 20'

BORING LOG

PAGE 3 OF 6

PROJECT NO: 4901162 FILE NO: 0793-3. log

BORING NO: MW-3

PROJECT NAME: CD Landfill

DATE BEGAN: 2/22/91

DATE FINISHED: 2/22/91

FIELD GEOLOGIST: M. Skrobacz

DRILLER: Mark Fletcher

NORTH: N/A

EAST: N/A.

GROUND SURFACE ELEV.: 11.61 feet

GWL DATE/TIME: 2/22/91

GWL DEPTH: 5.5 feet

DRILLING METHOD: 6-1/4" ID Hollow-stem auger

DRILL EQUIP: ATV

GWL EQUIP: ORS

CONTRACTOR: Hardin-Huber

CHECKED BY: N/A

[illegible]

BORING LOG

PAGE 4 OF 6

PROJECT NO: 4901162 FILE NO: 0793-4 log

BORING NO: MW-4

PROJECT NAME: CD Landfill

DATE BEGAN: 2/26/91

DATE FINISHED: N/A

FIELD GEOLOGIST: M. Skrobacz

DRILLER: Mark Fletcher

NORTH: N/A

EAST: N/A

GROUND SURFACE ELEV.: 16.68 feet

GWL DATE/TIME: 2/26/91

GWL DEPTH: N/A

DRILLING METHOD: 6-1/4" ID Hollow-stem auger

DRILL EQUIP: ATV

GWL EQUIP: ORS

CONTRACTOR: Hardin-Huber

CHECKED BY: N/A

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO	SPT BLOWS PER (0.5')	REC (FT)	P R O F I L E	DESCRIPTION	U S C S	VOLATILE ORGANIC VAPORS (ppm)		REMARKS
								FID	PID	
0.00		SS1	3-15			TOPSOIL/ROOTMAT				
-15.0			18-5 25			SILTY SAND: Black SAND with silt; (Fill).	SM			Field blank taken from SS
										Miscellaneous fill consists of glass, ash, metals, and concrete
-5.00		SS2	21-21			CLAY: Brown, lean CLAY; plastic; very moist (Fill).	CL			
-10.0			3-4							
		SS3	3-2							
			3-4							
-10.00						SILTY SAND: Yellow-brown SAND with silt; wet.	SM			
-5.0										
		SS4	2-2							
			2-2							
-15.00										
0.0										
		SS5	1-2							
			1-1							
-20.00										
-5.0										
		SS6	13-12			SAND: Grey SAND; fine, wet.	SP			Bottom of boring @ 25'
-25.00			9-12							

BORING LOG

PAGE 5 OF 6

PROJECT NO: 4901162 FILE NO: 0793-5 log BORING NO: MW-5 PROJECT NAME: CD Landfill
 DATE BEGAN: 2/20/91 DATE FINISHED: 2/21/91 FIELD GEOLOGIST: M. Skrabacz
 DRILLER: George Smith NORTH: N/A EAST: N/A
 GROUND SURFACE ELEV.: 10.10 feet GWL DATE/TIME: 2/21/91 GWL DEPTH: 7.5 feet
 DRILLING METHOD: 6-1/4" ID Hollow-stem auger DRILL EQUIP: ATV GWL EQUIP: ORS
 CONTRACTOR: Hardin-Huber CHECKED BY: N/A

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	VOLATILE ORGANIC VAPORS (ppm)		REMARKS
								FID	PID	
10.0	0.00	SS1	2-4			TOPSOIL/ROOTMAT		35		
			6-6			SILTY SAND: Yellow-brown SAND with silt and clay; very moist (fill)	SM			
						CLAY: Blue-green to black CLAY; plastic; moist (fill)	CH			
						SILT: Dark brown silt; organic.	OL			
5.0	-5.00	SS2	1-1			SANDY SILT: Dark brown to yellow-brown SILT with sand; trace clay; moist (fill)	ML	34		
			1-1							
		SS3	4-6			SAND: Yellow-brown SAND; trace silt; wet	SP	140		
			4-3							
0.0	-10.00									
		SS4	4-3					6.5		
			5-12							
5.0	-15.00									
		SS5	3					0		
			4-4							
10.0	-20.00									
						CLAY: Grey to yellow-brown CLAY; plastic;	CH			

Miscellaneous fill consists of asphalt, concrete, and gravel

Groundwater @ 7.5'

Bottom of boring @ 25'

BORING LOG

PAGE 6 OF 6

PROJECT NO: 4901162 FILE NO: 0793-6.log BORING NO: MW-6 PROJECT NAME: CD Landfill
 DATE BEGAN: 2/26/91 DATE FINISHED: 2/26/91 FIELD GEOLOGIST: M. Skrobacz
 DRILLER: Mark Fletcher NORTH: N/A EAST: N/A
 GROUND SURFACE ELEV.: 12.14 feet GWL DATE/TIME: 2/26/91 GWL DEPTH: 9.8 feet
 DRILLING METHOD: 6-1/4" ID Hollow-stem auger DRILL EQUIP: ATV GWL EQUIP: ORS
 CONTRACTOR: Hardin-Huber CHECKED BY: N/A

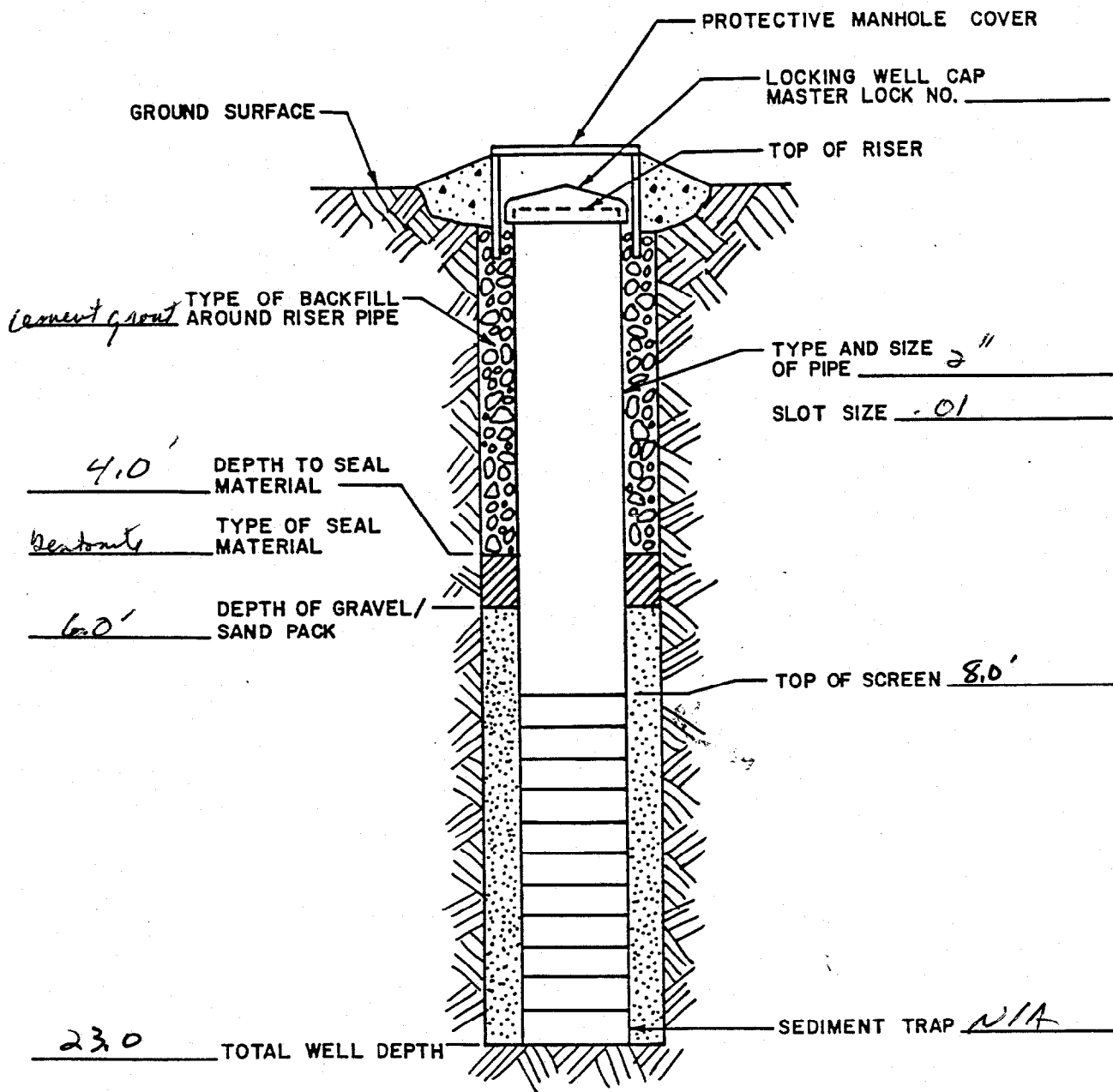
ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	VOLATILE ORGANIC VAPORS (ppm)		REMARKS
								FID	PID	
	0.00	SS1	2-1			TOPSOIL/ROOTMAT.				
			2-2			SILT: Black SILT with SAND; moist (Fill)	ML			
	10.0									
						CLAY: Grey, lean CLAY with sand; moist (Fill)	CL			
	-5.00	SS2	2-2							Composite sample collected from 5-9'
			2-2							
	5.0					SILT: Brown silt; organic; wet (Fill)	OL			
						CLAY: Brown, lean CLAY with sand; moist	CL			
	-10.00									Groundwater @ 9.8'
	0.0					SAND: Grey to reddish-yellow SAND; trace silt; wet	SP			
		SS3	2-3							
	-15.00		3-6							
	5.0									
		SS4	WOH							
	-20.00									
	10.0									
		SS5	8-5							
	-25.00		4-6			CLAY: Grey CLAY interbedded with sand; plastic.	CH			Bottom of boring @ 25'

APPENDIX C

Actual Groundwater Monitor Well Construction Diagrams

MONITOR WELL NO. MW-1
PROJECT CD Landfill
TYPE OF RIG ATV

DATE 2/25
INSTALL BY HHI



INSPECTED BY: M. Graham

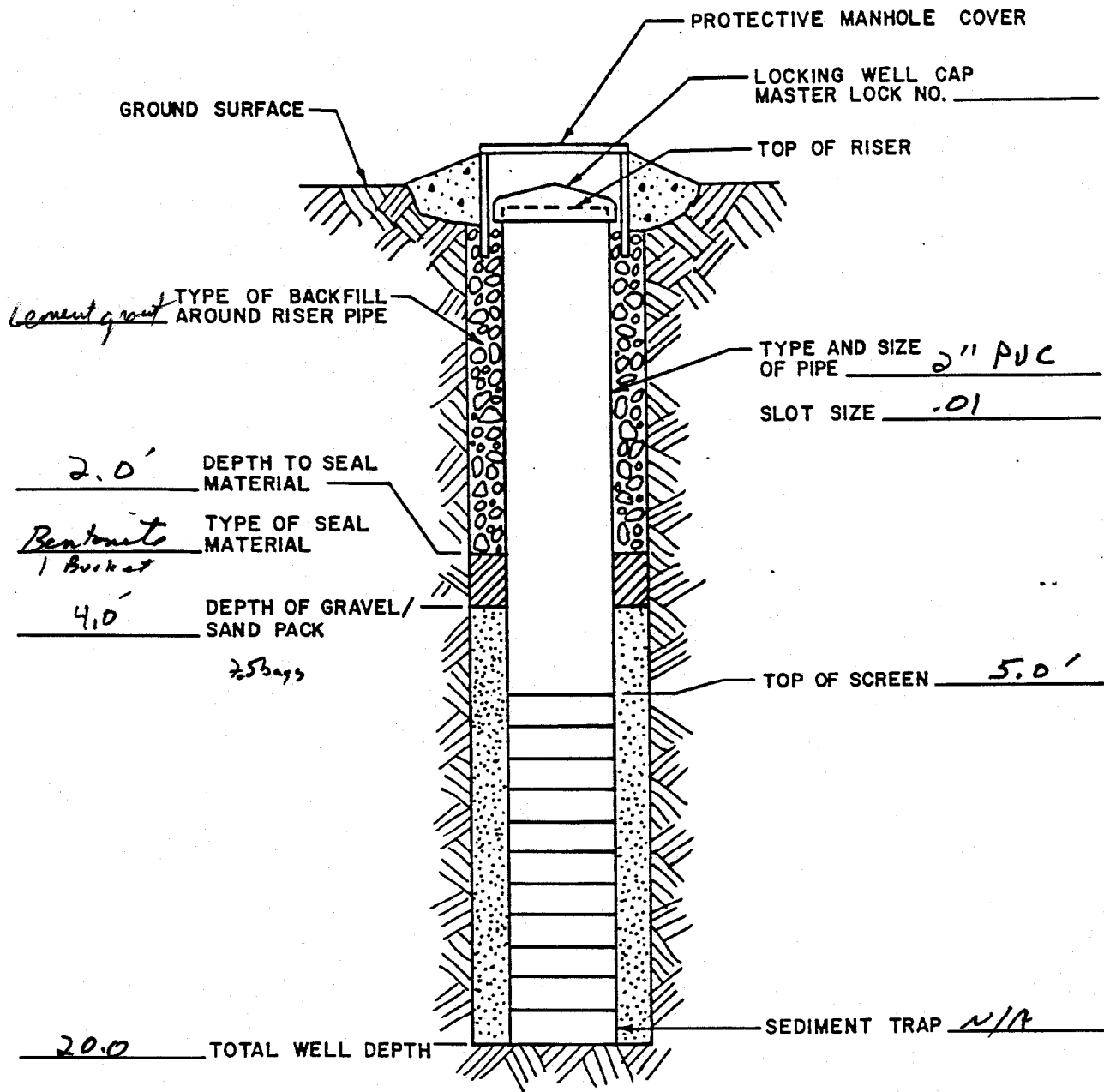
TYPICAL MONITOR WELL



Environmental
Science &
Engineering, Inc.

MONITOR WELL NO. MW-2
PROJECT CL Blandfield
TYPE OF RIG ATV

DATE 2/25/91
INSTALL BY H H I



INSPECTED BY: M. G. Kelley

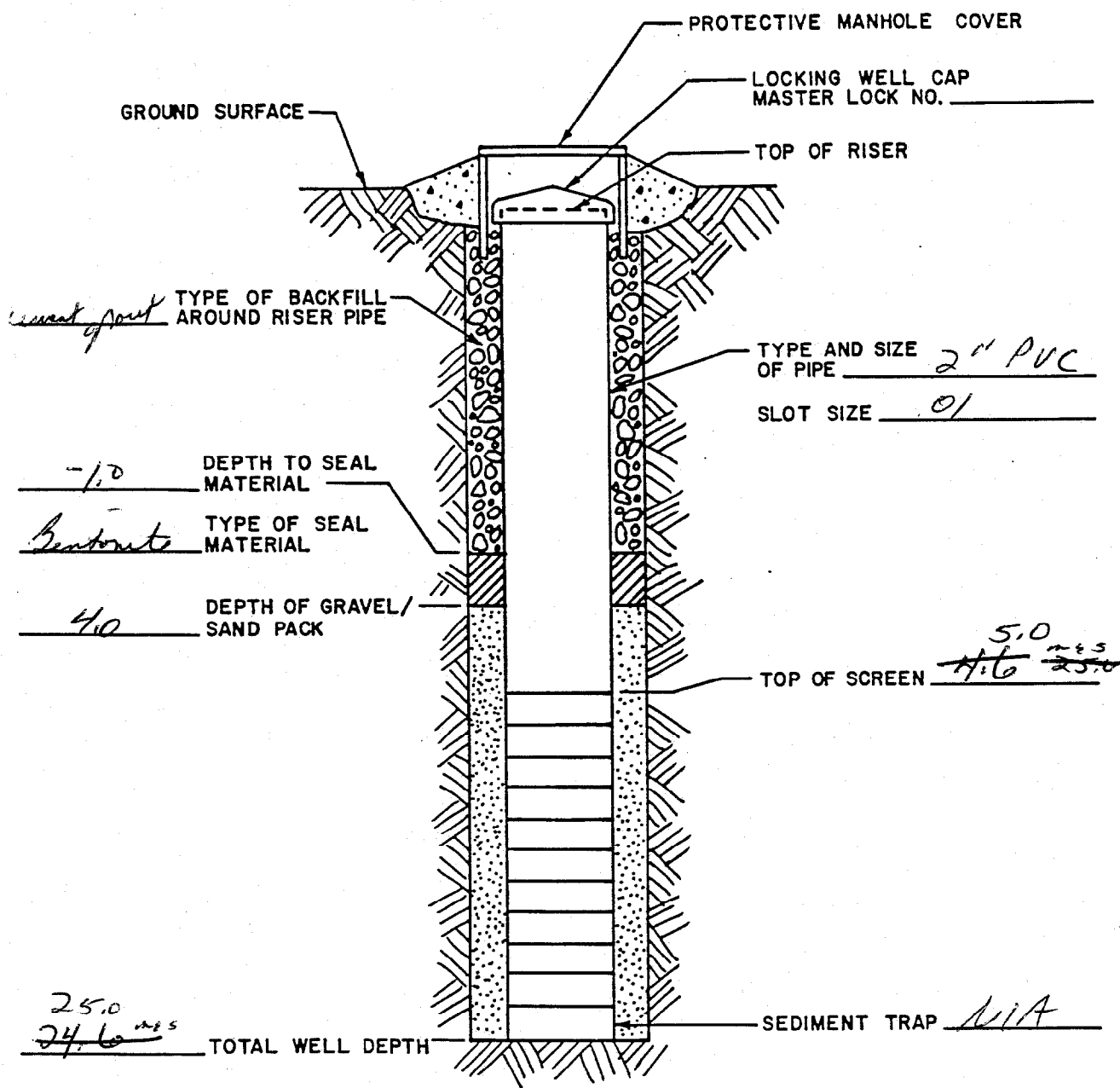
TYPICAL MONITOR WELL



Environmental
Science &
Engineering, Inc.

MONITOR WELL NO. MW-3
PROJECT CD Landfill
TYPE OF RIG HSA

DATE 2/22/91
INSTALL BY _____



INSPECTED BY: M. G. Grobner

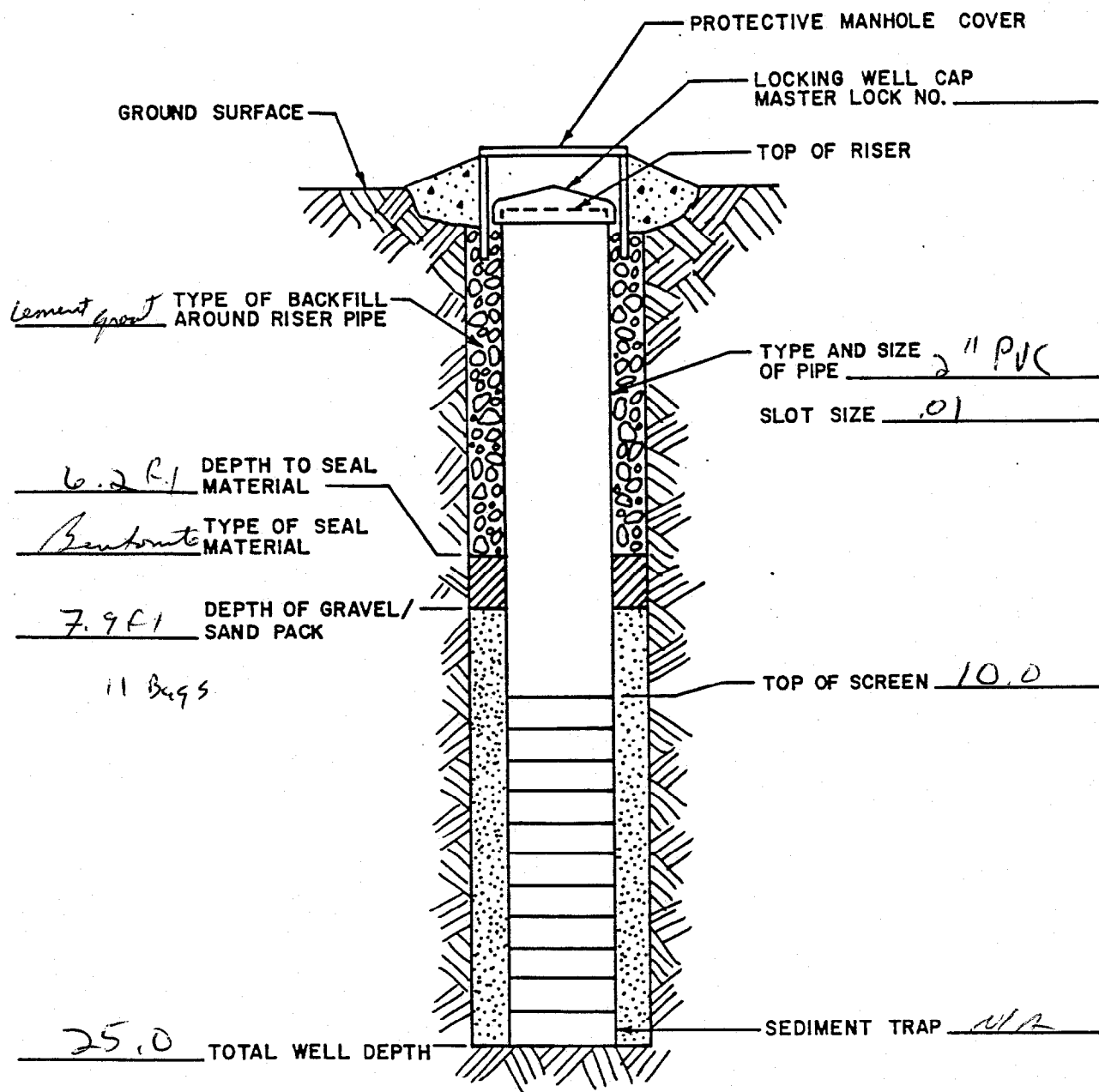
TYPICAL MONITOR WELL



Environmental
Science &
Engineering, Inc.

MONITOR WELL NO. MW-4
PROJECT CD Landfill
TYPE OF RIG ATV

DATE 2/23/91
INSTALL BY ~~2/27/91~~ HIL



INSPECTED BY: M. Spurling

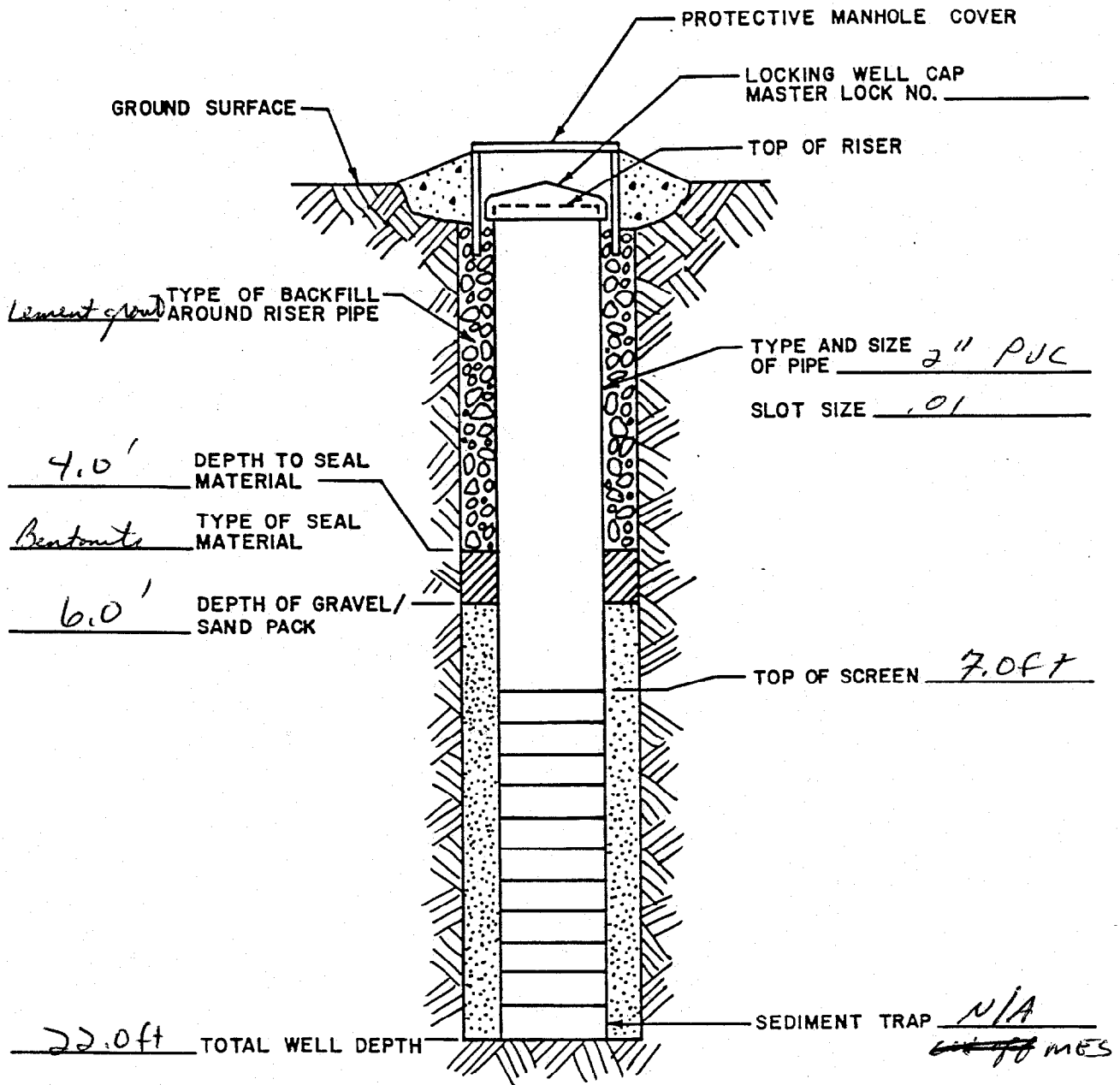
TYPICAL MONITOR WELL



Environmental
Science &
Engineering, Inc.

MONITOR WELL NO. MW-5
PROJECT CD Landfill
TYPE OF RIG CME 45 Skid Rig

DATE 2/21/91
INSTALL BY H/H I



INSPECTED BY: Mark Spofacy

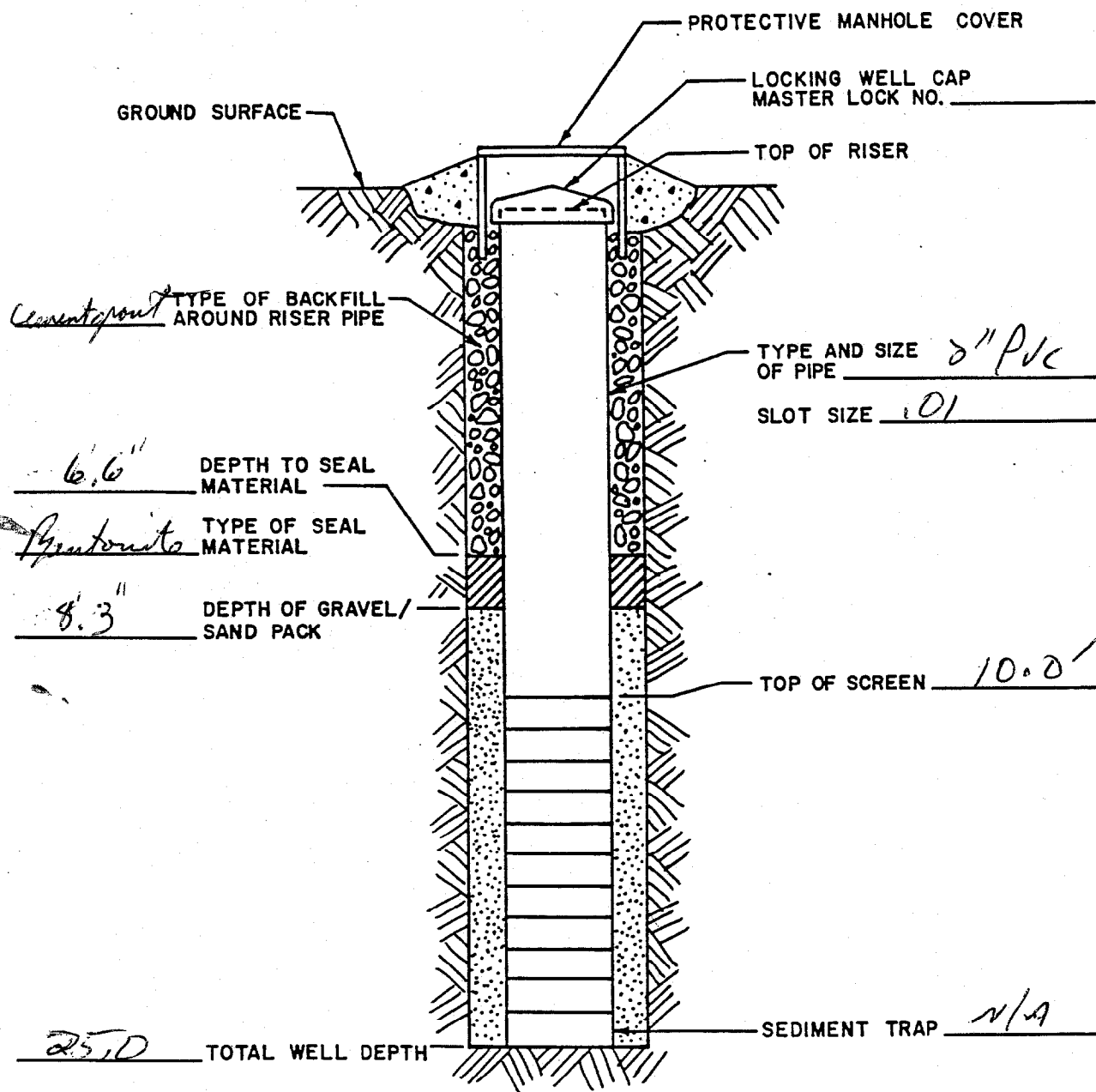
TYPICAL MONITOR WELL



Environmental
Science &
Engineering, Inc.

MONITOR WELL NO. MW-6
PROJECT CD Landfill
TYPE OF RIG ATV

DATE 2/26
INSTALL BY HFE



INSPECTED BY: M. G. Heston

TYPICAL MONITOR WELL



Environmental
Science &
Engineering, Inc.

APPENDIX D

Wetland Soil and Vegetation Descriptions

DATA FORM **ROUTINE ONSITE DETERMINATION METHOD¹**

Field Investigator(s): R.G. Martin Date: 2/26/91
 Project/Site: CD Landfill State: VA County: City of Norfolk
 Applicant/Owner: US Navy (Norfolk) Plant Community #/Name: North Ditch/wetland
 Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?

Yes No x (If no, explain on back)

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes x No (If yes, explain on back)

Made land soils/ Channelized Creek

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. <u>Phragmites australis</u>	<u>FACW</u>	<u>4</u>	11. <u> </u>	<u> </u>	<u> </u>
2. <u>Baccharis halimifolia</u>	<u>FACW</u>	<u>2</u>	12. <u> </u>	<u> </u>	<u> </u>
3. <u>Salix nigra</u>	<u>FACW+</u>	<u>1</u>	13. <u> </u>	<u> </u>	<u> </u>
4. <u>Liquidambar styraciflua</u>	<u>FAC</u>	<u>1</u>	14. <u> </u>	<u> </u>	<u> </u>
5. <u>Juncus effusus</u>	<u>FACW+</u>	<u>1</u>	15. <u> </u>	<u> </u>	<u> </u>
6. <u> </u>	<u> </u>	<u> </u>	16. <u> </u>	<u> </u>	<u> </u>
7. <u> </u>	<u> </u>	<u> </u>	17. <u> </u>	<u> </u>	<u> </u>
8. <u> </u>	<u> </u>	<u> </u>	18. <u> </u>	<u> </u>	<u> </u>
9. <u> </u>	<u> </u>	<u> </u>	19. <u> </u>	<u> </u>	<u> </u>
10. <u> </u>	<u> </u>	<u> </u>	20. <u> </u>	<u> </u>	<u> </u>

Percent of dominant species that are OBL, FACW, and/or FAC 100%

Is the hydrophytic vegetation criterion met? Yes x No

Rationale:

All observed plants FACW or FAC - most are FACW

SOILS

Series/phase: Made land

Subgroup:² -

Is the soil on the hydric soils list? Yes x No Undetermined x

Is the soil a Histosol? Yes No x Histic epipedon present? Yes No x

Is the soil: Mottled? Yes x No Gleyed? Yes No x

Matrix Color: Mottle Colors:

Other hydric soil indicators:

Is the hydric soil criterion met? Yes No x

Rationale:

soils very disturbed-have not developed hydric characteristics

HYDROLOGY

Is the ground surface inundated? Yes No x Surface water depth: N/A

Is the soil saturated? Yes x No

Depth to free-standing water in pit/soil probe hole: 2"

List other field evidence of surface inundation or soil saturation.

soils in a creek bed

Is the wetland hydrology criterion met? Yes x No

Rationale:

standing water at 2"

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes x No

Rationale for jurisdictional decision:

Plants and hydrology present-soils will form given time

¹ This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

² Classification according to "Soil Taxonomy."

DATE	JOB #	SOIL BORING #	FLAG #	PHOTO #	COMMUNITY TYPE: creek bed	
					LOCATION DESCRIPTION:	
2/26/91	CDL	CD-1	AA-2 AB-2	-	RECORDER NAME: R.G. Martin	
DEPTH	COLOR	USDA TEXTURE		MOTTLES		
0-4	10 YR 3/1	sandy silt loam		-	-	PONDING: -
4-12	10 YR 5/8	sandy silt		10 TR 6/2	-	FLOODING: -
12-20	10 YR 6/2	silty sand		-	-	MORPHOLOGICAL:
						OTHER:
						SAT. DEPTH 1"
						WATER DEPTH 2"
						CLASSIFICATION:
						<input checked="" type="checkbox"/> HYDRIC
						<input type="checkbox"/> NONHYDRIC

VEGETATION			Cover	EPA Cover Class Methodology		Cover
Species				4 = 26-50%		
				1 = 1-5%		
				2 = 6-15%		
				3 = 16-25%		
Canopy						
Shrub/Saplings						
Herbaceous				Woody Vines		
Notes						
Latest Rainfall unknown						

DATA FORM **ROUTINE ONSITE DETERMINATION METHOD¹**

Field Investigator(s): R.G. Martin Date: 2/26/91
 Project/Site: CD Landfill State: VA County: City of Norfolk
 Applicant/Owner: US Navy Plant Community #/Name: North Ditch/Upland
 Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?

Yes ☐ No ☒ (If no, explain on back)

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes ☒ No ☐ (If yes, explain on back)

Made land soils with non-native components

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. <u>Unidentified grass</u>	<u>?</u>	<u>6</u>	11. _____	_____	_____
2. _____	_____	_____	12. _____	_____	_____
3. _____	_____	_____	13. _____	_____	_____
4. _____	_____	_____	14. _____	_____	_____
5. _____	_____	_____	15. _____	_____	_____
6. _____	_____	_____	16. _____	_____	_____
7. _____	_____	_____	17. _____	_____	_____
8. _____	_____	_____	18. _____	_____	_____
9. _____	_____	_____	19. _____	_____	_____
10. _____	_____	_____	20. _____	_____	_____

Percent of dominant species that are OBL, FACW, and/or FAC undetermined

Is the hydrophytic vegetation criterion met? Yes ☐ No ☐

Rationale: _____

SOILS

Series/phase: Made land Subgroup:² -
 Is the soil on the hydric soils list? Yes ☐ No ☐ Undetermined ☒
 Is the soil a Histosol? Yes ☐ No ☒ Histic epipedon present? Yes ☐ No ☒
 Is the soil: Mottled? Yes ☐ No ☒ Gleyed? Yes ☐ No ☒
 Matrix Color: 5 YR 5/1 10 YR 2/2 Mottle Colors: N/A
 Other hydric soil indicators: None
 Is the hydric soil criterion met? Yes ☐ No ☒
 Rationale: unnatural soils-top 10" apparently ash. Landfill material below 18"

HYDROLOGY

Is the ground surface inundated? Yes ☐ No ☒ Surface water depth: _____
 Is the soil saturated? Yes ☐ No ☒
 Depth to free-standing water in pit/soil probe hole: None
 List other field evidence of surface inundation or soil saturation.
None
 Is the wetland hydrology criterion met? Yes ☐ No ☒
 Rationale: No hydrological indicators present

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ☐ No ☒

Rationale for jurisdictional decision: _____

Vegetative, hydrological, and soil characteristics absent

¹ This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

² Classification according to "Soil Taxonomy."

DATE	JOB #	SOIL BORING #	FLAG #	PHOTO #	COMMUNITY TYPE:
					Upland grass field
					LOCATION DESCRIPTION: top of bank
2/26/91	CDL	CD-2	-	-	RECORDER NAME: R.G. Martin
DEPTH	COLOR	USDA TEXTURE	MOTTLES		
0-10	5 YR 5/1	gritty ash	-	-	PONDING: -
10-17	10 YR 2/2	gritty loam	-	-	FLOODING: -
17-25	10 YR 2/1	landfill debris & sand	-	-	MORPHOLOGICAL:
					OTHER:
					SAT. DEPTH -
					WATER DEPTH -
					CLASSIFICATION:
					<input type="checkbox"/> HYDRIC
					<input checked="" type="checkbox"/> NONHYDRIC

VEGETATION		Cover	EPA Cover Class Methodology		Cover
Species			1 = 1-5%	4 = 26-50%	
Canopy			2 = 6-15%	5 = 51-75%	
			3 = 16-25%	6 = 76-95%	
				7 = 96-100%	
Shrub/Saplings					
Herbaceous			Woody Vines		
Notes					
Latest Rainfall unknown					

DATA FORM **ROUTINE ONSITE DETERMINATION METHOD¹**

Field Investigator(s): R.G. Martin Date: 3/4/91
 Project/Site: CD Landfill State: VA County: City of Norfolk
 Applicant/Owner: US Navy (Norfolk) Plant Community #/Name: South Ditch/wet
 Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?

Yes ☐ No ☒ (If no, explain on back)

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes ☒ No ☐ (If yes, explain on back)

Made Land-Ditched

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. <u>Phragmites australis</u>	<u>FACW</u>	<u>5</u>	11. _____	_____	_____
2. <u>Aster spp</u>	<u>—</u>	<u>3</u>	12. _____	_____	_____
3. <u>Setaria glauca</u>	<u>FAC</u>	<u>1</u>	13. _____	_____	_____
4. <u>Xanthium chinense</u>	<u>NI</u>	<u>1</u>	14. _____	_____	_____
5. <u>Andropogon glomeratus</u>	<u>FACW+</u>	<u>1</u>	15. _____	_____	_____
6. _____	_____	_____	16. _____	_____	_____
7. _____	_____	_____	17. _____	_____	_____
8. _____	_____	_____	18. _____	_____	_____
9. _____	_____	_____	19. _____	_____	_____
10. _____	_____	_____	20. _____	_____	_____

Percent of dominant species that are OBL, FACW, and/or FAC 60+ FACW

Is the hydrophytic vegetation criterion met? Yes ☒ No ☐

Rationale: _____

Phragmites dominated -Aster highly likely also FACW but not ID'ed

SOILS

Series/phase: Made Land Subgroup:² —
 Is the soil on the hydric soils list? Yes ☐ No ☐ Undetermined ☒
 Is the soil a Histosol? Yes ☐ No ☒ Histic epipedon present? Yes ☐ No ☒
 Is the soil: Mottled? Yes ☒ No ☐ Gleyed? Yes ☐ No ☒
 Matrix Color: 10 YR 6/6 Mottle Colors: _____

Other hydric soil indicators: _____

Is the hydric soil criterion met? Yes ☐ No ☐

Rationale: soil at 17-20" possibly original A horizon, hard to determine

HYDROLOGY

Is the ground surface inundated? Yes ☐ No ☒ Surface water depth: N/A-but at edge of puddle

Is the soil saturated? Yes ☒ No ☐

Depth to free-standing water in pit/soil probe hole: 12"

List other field evidence of surface inundation or soil saturation.

Sample taken at edge of puddle. Clotbur w/adventitious roots. Topography

Is the wetland hydrology criterion met? Yes ☒ No ☐

Rationale: _____

several indicators of wetland hydrology present

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ☒ No ☐

Rationale for jurisdictional decision: _____

plants and hydrology present. Soils are made land w/out hydric features

¹ This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

² Classification according to "Soil Taxonomy."

DATE	JOB #	SOIL BORING #	FLAG #	PHOTO #	COMMUNITY TYPE:	
					Field	
					LOCATION DESCRIPTION:	
					Between BA-6 & BB-6	
3/4/91	CDL	CD-4	BA-6 BB-6		RECORDER NAME: Ron Martin	
DEPTH	COLOR	USDA TEXTURE		MOTTLES		
0-4	10 YR 3/1	sand and shell fragments		-	-	PONDING:
4-16	sandy silt loam	10 YR 6/6		10 YR 5/8	10 YR 5/3	FLOODING:
16-17	sandy silt	5Y 5/1		N 4/0	10 YR 6/8	MORPHOLOGICAL:
17-20	silt loam	2.5 Y 2/0		-	-	OTHER:
20+	sandy silt loam	5 Y 4/1		-	-	SAT. DEPTH
						WATER DEPTH
						CLASSIFICATION:
						<input type="checkbox"/> HYDRIC
						<input type="checkbox"/> NONHYDRIC

VEGETATION				EPA Cover Class Methodology		
Species			Cover	1 = 1-5%	4 = 26-50%	Cover
Canopy				2 = 6-15%	5 = 51-75%	
				3 = 16-25%	6 = 76-95%	
Shrub/Saplings					7 = 96-100%	
Herbaceous				Woody Vines		
Notes						
Latest Rainfall						

DATA FORM **ROUTINE ONSITE DETERMINATION METHOD¹**

Field Investigator(s): R.G. Martin Date: 3/4/91
 Project/Site: CD Landfill State: VA County: City of Norfolk
 Applicant/Owner: US Navy (Norfolk) Plant Community #/Name: South Ditch-Upland
 Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?

Yes ☐ No ☒ (If no, explain on back)

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes ☒ No ☐ (If yes, explain on back) Made Land

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. <u>Unidentified Grass</u>	<u>?</u>	<u>5</u>	11. _____	_____	_____
2. <u>Aster SPP</u>	<u>?</u>	<u>2</u>	12. _____	_____	_____
3. <u>Setaria Glauca</u>	<u>FAC</u>	<u>2</u>	13. _____	_____	_____
4. <u>Andropogon Glomeratus</u>	<u>FACW</u>	<u>4</u>	14. _____	_____	_____
5. <u>Andropogon Virginicus</u>	<u>FAC</u>	<u>1</u>	15. _____	_____	_____
6. _____	_____	_____	16. _____	_____	_____
7. _____	_____	_____	17. _____	_____	_____
8. _____	_____	_____	18. _____	_____	_____
9. _____	_____	_____	19. _____	_____	_____
10. _____	_____	_____	20. _____	_____	_____

Percent of dominant species that are OBL, FACW, and/or FAC undetermined

Is the hydrophytic vegetation criterion met? Yes ☐ No ☐

Rationale: Grass the same grass dominating most of the landfill

SOILS

Series/phase: Made Land Subgroup: 2

Is the soil on the hydric soils list? Yes ☐ No ☐ Undetermined ☒

Is the soil a Histosol? Yes ☐ No ☒ Histic epipedon present? Yes ☐ No ☒

Is the soil: Mottled? Yes ☐ No ☒ Gleyed? Yes ☐ No ☒

Matrix Color: 10 YR6/4 10YR5/3 Mottle Colors: None

Other hydric soil indicators: None

Is the hydric soil criterion met? Yes ☐ No ☒

Rationale: No hydric indicators present-made land soils

HYDROLOGY

Is the ground surface inundated? Yes ☐ No ☒ Surface water depth: N/A

Is the soil saturated? Yes ☐ No ☒

Depth to free-standing water in pit/soil probe hole: None

List other field evidence of surface inundation or soil saturation. None

Is the wetland hydrology criterion met? Yes ☐ No ☒

Rationale: No hydrologic indicators present.

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ☐ No ☒

Rationale for jurisdictional decision: Plants and soils undeterminant/Hydrology not present.

¹ This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

² Classification according to "Soil Taxonomy."

DATE	JOB #	SOIL BORING #	FLAG #	PHOTO #	COMMUNITY TYPE:	
					Field	
					LOCATION DESCRIPTION:	
					10' North of BB-8	
3/4/91	CDL	CD-5	BB-8	—	RECORDER NAME: R.G. Martin	
DEPTH	COLOR	USDA TEXTURE		MOTTLES		
0-10	10 YR 6/4	Sand and shell fragments		—	—	PONDING: None
10-19	10 YR 2/0	Granular coa-lite material		—	—	FLOODING: None
19-30	10 YR 5/3	Sandy silt loam		10 YR 4/6	—	MORPHOLOGICAL: —
30-33	10 YR 5/2	Sandy silt loam		10 YR 4/6	—	OTHER: —
						SAT. DEPTH —
						WATER DEPTH —
						CLASSIFICATION:
						<input type="checkbox"/> HYDRIC
						<input checked="" type="checkbox"/> NONHYDRIC

VEGETATION			Cover	EPA Cover Class Methodology		Cover
Species				4 = 26-50%		
				5 = 51-75%		
				6 = 76-95%		
				7 = 96-100%		
Canopy						
Shrub/Saplings						
Herbaceous				Woody Vines		
Notes						
Latest Rainfall						

APPENDIX E

Groundwater Monitor Well Liquid Level Data

(Will be included in the Final Report)

APPENDIX F

Laboratory Analysis Quality Assurance/Quality Control (QA/QC) Data

TRACE METAL DATA PACKAGE
(LEVEL C)
FOR
NAVY - CD LANDFILL

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2. Data Summary (Form 1)	5
3. QC Summary (Form 2-6,8)	18
4. Control Charts	28

1. COVER PAGE AND CASE NARRATIVE

00002

U. S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG.No.: G21088

SOW No. 7/88

EPA Sample No.	Lab Sample ID
EOPBLK	NACDLW2*10
EOPBLK	NACDLW2*11
FD#	NACDLW2*8
FD#D	RP*NACDLW2*8
FD#S	SPM1*NACDLW2*8
FD#S	SPM2*NACDLW2*8
FLDBLK	NACDLW2*9
MW1	NACDLW2*1
MW2	NACDLW2*2
MW3	NACDLW2*3
MW4	NACDLW2*4
MW5	NACDLW2*5
MW6	NACDLW2*6
SW2	NACDLW2*14
SW3	NACDLW2*15

Were ICP interelement corrections applied?

Yes/No Y

Were ICP background corrections applied?

Yes/No Y

If yes, were raw data generated before application of background corrections?

Yes/No N

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Ken U. Erondw

Name: KENNETH U. ERONDW

Date: July 18, 1991

Title: MANAGER - INORGANIC CHEM. DIVISION

COVER PAGE - IN

00003

CASE NARRATIVE

GENERAL

A total of 12 samples are reported under this sample delivery group (SDG) number G21088. Samples SW2, SW3 and the equipment blank were collected 6/10/91 and the remaining samples were collected 6/12/91. All samples were received in good condition. The fraction for total metals was appropriately preserved. All analyses were performed within required holding times.

ANALYSIS SUMMARY

Total Sodium, Cadmium, Iron and Lead were analyzed by ICP. Analytical methods as stated in EPA-CLP Statement of Work (SOW) for Inorganic Analyses No. 7/88 were employed to generate the enclosed Level C data package. A matrix spike duplicate (MSD) sample analysis, a non-CLP requirement, was also performed as requested by the Client.

QUALITY CONTROL ANALYSIS SUMMARY

All QC analyses were within acceptable control limits.

2. DATA SUMMARY (Form 1)

00005

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW1

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*1

Level (low/med):

Date Received: 06/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	46200.00			P
7439-92-1	Lead	45.10			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	23700.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

7/88

00006

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW2

Lab Name: E.S.E.

Contract: NVE-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*2

Level (low/med):

Date Received: 06/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	47500.00			P
7439-92-1	Lead	60.70			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	42300.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

7/88

00007

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW3

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*3

Level (low/med):

Date Received: 06/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	4070.00			P
7439-92-1	Lead	34.50	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	10000.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

7/88

00008

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW4

Lab Name: E.S.E.

Contract: NVC-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*4

Level (low/med):

Date Received: 06/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	139000.00			P
7439-92-1	Lead	113.00			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	128000.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

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00009

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW5

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*5

Level (low/med):

Date Received: 06/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	98600.00			P
7439-92-1	Lead	52.80			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	29100.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

7/88

00010

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW6

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*6

Level (low/med):

Date Received: 06/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	105000.00			P
7439-92-1	Lead	128.00			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	22200.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

FD#

Lab Name: E.S.E.

Contract: NVCY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*8

Level (low/med):

Date Received: 06/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	57800.00			P
7439-92-1	Lead	39.00			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	24600.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

FLDBLK

Lab Name: E.S.E.

Contract: NAVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*9

Level (low/med):

Date Received: 06/13/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	13.50	B		P
7439-92-1	Lead	34.50	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	264.00	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

EQPBLK

Lab Name: E.S.E.

Contract: NVC-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*10

Level (low/med):

Date Received: 06/11/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	6.20	U		P
7439-92-1	Lead	34.50	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	483.00	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

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00014

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

EQPBLK

Lab Name: E.S.E.

Contract: NVE-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*11

Level (low/med):

Date Received: 06/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	8.40	B		P
7439-92-1	Lead	34.50	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	494.00	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

7/88

00015

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SW2

Lab Name: E.S.E.

Contract: NVC-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*14

Level (low/med):

Date Received: 06/11/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	2650.00			P
7439-92-1	Lead	34.50	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	15300.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

7/88

00016

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SW3

Lab Name: E.S.E.

Contract: NVD-CDLF

Lab Code:

Case No.:

SAS No.:

SDG No.: G21088

Matrix (soil/water): WATER

Lab Sample ID: NACDLW2*15

Level (low/med):

Date Received: 06/11/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	38100.00			P
7439-92-1	Lead	34.50	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	24000.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

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00017

3. QC SUMMARY (FORM 2-6,8)

00018

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG.No.: G21088

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			True	Continuing Calibration			M
	True	Found	%R(1)		Found	%R(1)	Found	
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium	1000.0	1008.18	100.8					P
Calcium								
Chromium								
Cobalt								
Copper								
Iron	1000.0	1027.83	102.8					P
Lead	1000.0	1007.66	100.8					P
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								P
Thallium								
Vanadium								
Zinc								
Cyanide								

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

FORM II (PART 1) - IN

7/88

00019

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: E.S.E.

Contract: NVE-CDLF

Lab Code:

Case No.:

SAS No.:

SDG.No.: G21088

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium				500.0	492.85	98.6	509.28	101.9	P
Calcium									
Chromium									
Cobalt									
Copper									
Iron				5000.0	4969.90	99.4	5093.98	101.9	P
Lead				500.0	498.24	99.6	520.27	104.1	P
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium	1000.0	1028.15	102.8	5000.0	5112.55	102.3	5283.38	105.7	P
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

FORM II (PART 1) - IN

7/88

00020

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG.No.: G21088

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium				500.0	510.56	102.1	499.20	99.8	P
Calcium									
Chromium									
Cobalt									
Copper									
Iron				5000.0	5172.93	103.5	5096.33	101.9	P
Lead				500.0	510.32	102.1	492.33	98.5	P
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium				5000.0	5371.72	107.4	5339.78	106.8	P
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

3
BLANKS

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG.No.: G21088

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			1	C	2	C	3	C			
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	P
Calcium											
Chromium											
Cobalt											
Copper											
Iron	6.2	U	6.2	U	6.2	U	6.2	U	7.030	B	P
Lead	34.5	U	34.5	U	34.5	U	34.5	U	34.5	U	P
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium	59.7	U	59.7	U	59.7	U	59.7	U	95.790	B	P
Thallium											
Vanadium											
Zinc											
Cyanide											

FORM III - IN

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00022

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: E. S. E.Contract: NAVY-CDLF

Lab Code: _____ Case No: _____

SAS No.: _____ SDG No.: G21088ICP ID Number: JA1100 CLP

ICS Source: _____

Concentration Units: ug/L

Analyte	True		Initial Found			Final Found		
	Sol. A	Sol. AB	Sol. A	Sol. AB	%R	Sol. A	Sol. AB	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium		1000		956.1	95.6		970.2	97.0
Calcium								
Chromium								
Cobalt								
Copper								
Iron	200,000	200,000	178,094	177,252	88.6	176,665	178,756	89.4
Lead		1000		947.4	94.7		946.8	94.7
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: E.S.E.

Contract: NVY-CDLF

FD#S

Lab Code:

Case No.:

SAS No.:

SDG.No.: G21088

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium	75-125	45.3100		3.0000	U	50.00	90.6		P
Calcium									
Chromium									
Cobalt									
Copper									
Iron		56499.6100		57782.3700		1000.00	-128.3		P
Lead	75-125	503.1100		39.0000		500.00	92.8		P
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium	75-125	34237.6600		24578.7800		10000.00	96.6		P
Thallium									
Vanadium									
Zinc									
Cyanide									

Comments:

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: E.S.E.

Contract: NVY-CDLF

FD#S

Lab Code:

Case No.:

SAS No.:

SDG.No.: G21088

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium	75-125	47.6600		3.0000	U	50.00	95.3		P
Calcium									
Chromium									
Cobalt									
Copper									
Iron		58404.7500		57782.3700		1000.00	62.2		P
Lead	75-125	523.1100		39.0000		500.00	96.8		P
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium	75-125	35009.3100		24578.7800		10000.00	104.3		P
Thallium									
Vanadium									
Zinc									
Cyanide									

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

FD#D

Lab Name: E.S.E.

Contract: NVY-CDLF

Lab Code:

Case No.:

SAS No.:

SDG.No.: G21088

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium		3.0000	U	3.0000	U			P
Calcium								
Chromium								
Cobalt								
Copper								
Iron		57782.3700		55454.4300		4.1		P
Lead		39.0000		38.0900		2.4		P
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium	5000	24578.7800		24107.2800		1.9		P
Thallium								
Vanadium								
Zinc								
Cyanide								

FORM VI - IN

7/88

00026

4. CONTROL CHARTS

INORGANIC ANALYSES DATA PACKAGE

SUPPLEMENT

(LEVEL C / EPA-SW846)

FOR

NAVY CD LANDFILL

ANALYTICAL SERVICES
QUALITY ASSURANCE CORRECTIVE ACTION FORM

1. Individual identifying the problem: Jeff Shemis
Nature of problem: 3 NACDLW2 samples (*10, 14, 15) missed 7 day hold time by 1 day. Expiration of HT (on 6/17) was anticipated on 6/14/91, but instrument problems prevented successful analysis until 6/18/91. Client was informed on 6/18/91.
Signature: Jeff Shemis Date relinquished: 7/22/91
2. Individual determining corrective action: VK Allen Date received: 7/22/91
Action to be taken: Service call was made to repair unit (we had a phone call). It has been running more reliably since then.
Signature: [Signature] Date relinquished: 7/22/91
3. Individual responsible for implementing action: VK Allen Date received: 7/22/91
Signature: [Signature] Date implemented: 7/22/91
4. Individual responsible for assuring the effectiveness of the action: PO Pisigan
Action taken to assure effectiveness: Review/audit runs since repair and periodically thereafter

Corrective action status: ☒ Acceptable

Signature: Portia O. Pisigan

☐ Unacceptable

Date: 7/22/91

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW1
PARAMETERS		STORET	NACDLW2
	UNITS	METHOD	
DATE			06/12/91
TIME			14:30
PH, LAB		403	4.37
	STD UNITS	I	
SPECIFIC COND., LAB		95	927
	UMHOS/CM	I	
TOX		70353	97
	UG/L-CL	I	
HARDNESS		900	328
	MG/L-CACO3	TITR	
CARBON, TOC		680	5.1
	MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 2
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW2
PARAMETERS		STORET	NACDLW2
UNITS		METHOD	
DATE			06/12/91
TIME			08:30
PH, LAB		403	5.18
	STD UNITS	I	
SPECIFIC COND., LAB		95	641
	UMHOS/CM	I	
TOX		70353	33
	UG/L-CL	I	
HARDNESS		900	208
	MG/L-CACO3	TITR	
CARBON, TOC		680	15.7
	MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 3
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW3
PARAMETERS		STORET	NACDLW2
UNITS		METHOD	
DATE			06/12/91
TIME			12:00
PH, LAB		403	6.19
	STD UNITS	I	
SPECIFIC COND., LAB		95	322
	UMHOS/CM	I	
TOX		70353	59
	UG/L-CL	I	
HARDNESS		900	132
	MG/L-CACO3	TITR	
CARBON, TOC		680	4.7
	MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91
PROJECT NAME
LAB COORDINATOR J.D. SHAMIS

STATUS: FINAL PAGE 4
NAVY - CD LANDFILL

SAMPLE ID'S			MW4
PARAMETERS		STORET	NACDLW2
UNITS		METHOD	
DATE			06/12/91
TIME			09:30
PH, LAB		403	6.51
	STD UNITS	I	
SPECIFIC COND., LAB		95	1410
	UMHOS/CM	I	
TOX		70353	39
	UG/L-CL	I	
HARDNESS		900	596
	MG/L-CACO3	TITR	
CARBON, TOC		680	14.1
	MG/L	I	

PROJECT NUMBER 3914022 0201

PROJECT NAME

NAVY - CD LANDFILL

FIELD GROUP

NACDLW2

LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW5
PARAMETERS		STORET	NACDLW2
	UNITS	METHOD	
DATE			06/12/91
TIME			11:15
PH, LAB		403	6.21
	STD UNITS	I	
SPECIFIC COND., LAB		95	573
	UMHOS/CM	I	
TOX		70353	51
	UG/L-CL	I	
HARDNESS		900	220
	MG/L-CACO3	TITR	
CARBON, TOC		680	9.7
	MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 6
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW6
PARAMETERS		STORET	NACDLW2
UNITS		METHOD	
DATE			06/12/91
TIME			10:05
PH, LAB		403	6.13
	STD UNITS	I	
SPECIFIC COND., LAB		95	607
	UMHOS/CM	I	
TOX		70353	<10
	UG/L-CL	I	
HARDNESS		900	288
	MG/L-CACO3	TITR	
CARBON, TOC		680	9.3
	MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 7
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S		FD#
PARAMETERS	STORET	NACDLW2
UNITS	METHOD	
DATE		06/12/91
TIME		
PH, LAB	403	4.39
STD UNITS	I	
SPECIFIC COND., LAB	95	918
UMHOS/CM	I	
TOX	70353	49
UG/L-CL	I	
HARDNESS	900	328
MG/L-CACO3	TITR	
CARBON, TOC	680	4.1
MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 8
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S	FLDBLK
PARAMETERS	NACDLW2
UNITS	
STORET	
METHOD	9
DATE	06/12/91
TIME	15:20
PH, LAB	403 6.24
STD UNITS	I
SPECIFIC COND., LAB	95 <10.00
UMHOS/CM	I
TOX	70353 <10
UG/L-CL	I
HARDNESS	900 <1.0
MG/L-CACO3	TITR
CARBON, TOC	680 <1.0
MG/L	I

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 9
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			EQPBLK
PARAMETERS		STORET	NACDLW2
	UNITS	METHOD	
DATE			06/10/91
TIME			17:00
PH, LAB		403	6.48
	STD UNITS	I	
SPECIFIC COND., LAB		95	<10.00
	UMHOS/CM	I	
TOX		70353	10
	UG/L-CL	I	
HARDNESS		900	<1.0
	MG/L-CACO3	TITR	
CARBON, TOC		680	<1.0
	MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 10
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			EQPBLK
PARAMETERS		STORET	NACDLW2
	UNITS	METHOD	
DATE			06/12/91
TIME			15:15
PH, LAB		403	6.17
	STD UNITS	I	
SPECIFIC COND., LAB		95	<10.00
	UMHOS/CM	I	
TOX		70353	<10
	UG/L-CL	I	
HARDNESS		900	<1.0
	MG/L-CACO3	TITR	
CARBON, TOC		680	<1.0
	MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 11
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			SW2
PARAMETERS		STORET	NACDLW2
UNITS		METHOD	14
DATE			06/10/91
TIME			14:30
PH, LAB		403	7.88
	STD UNITS	I	
SPECIFIC COND., LAB		95	320
	UMHOS/CM	I	
TOX		70353	13
	UG/L-CL	I	
HARDNESS		900	172
	MG/L-CACO3	TITR	
CARBON, TOC		680	5.2
	MG/L	I	

Environmental Science & Engineering
PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLW2

07/20/91 STATUS: FINAL PAGE 12
PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S	STORET	SW3
PARAMETERS	METHOD	NACDLW2
UNITS		15
DATE		06/10/91
TIME		14:00
PH, LAB	403	7.17
STD UNITS	I	
SPECIFIC COND., LAB	95	409
UMHOS/CM	I	
TOX	70353	84
UG/L-CL	I	
HARDNESS	900	180
MG/L-CACO3	TITR	
CARBON, TOC	680	7.0
MG/L	I	

ESE BATCH : 620647

SAMPLE CODE	CLIENT ID
NACDLW2*10	EQPBLK
NACDLW2*14	SW2
NACDLW2*15	SW3

Continuing Calibration Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND
06/11/91	CCB*QC*1	403*1	PH,LAB	STD UNITS	7.31

Continuing Calibration Verification Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	TARGET	FOUND	%RECV	RECV CRIT
06/11/91	CCV*QC*1	403*1	PH,LAB	STD UNITS	7.00	0.11	1.57	0-0

Method Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND
06/11/91	MB*QC*1	403*1	PH,LAB	STD UNITS	6.89

Replicate Analysis Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	REP #1	REP #2	RPD	RPD CRIT
06/11/91	RP*NACDLW2*14	403*1	PH,LAB	STD UNITS	7.88	7.88	0.0	4
06/11/91	RP*NACDLW2*15	403*1	PH,LAB	STD UNITS	7.17	7.17	0.0	4

Computer QC Checks

	Yes	No	Exceptions
			Comment / Corrective Action
Analysis holding time within criteria?	X		
Extract holding time within criteria?	X		
Sample replicate present?	X		
Sample replicate within acceptance criteria?	X		

ESE BATCH : G20687

SAMPLE CODE	CLIENT ID
NACDLW2*1	MW1
NACDLW2*2	MW2
NACDLW2*3	MW3
NACDLW2*4	MW4
NACDLW2*5	MW5
NACDLW2*6	MW6
NACDLW2*8	FD#
NACDLW2*9	FLDBLK
NACDLW2*11	EQPBLK

Continuing Calibration Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND
06/13/91	CCB*QC*1	403*1	PH,LAB	STD UNITS	6.32

Continuing Calibration Verification Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	TARGET	FOUND	%RECV	RECV CRIT
06/13/91	CCV*QC*1	403*1	PH,LAB	STD UNITS	7.00	0.25	3.57	0-0

Method Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND
06/13/91	MB*QC*1	403*1	PH,LAB	STD UNITS	6.77

Replicate Analysis Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	REP #1	REP #2	RPD	RPD CRIT
06/13/91	RP*NACDLW2*8	403*1	PH,LAB	STD UNITS	4.39	4.40	0.23	4

Computer QC Checks

	Yes	No	"Exceptions" Comment / Corrective Action
Analysis holding time within criteria?	X		
Extract holding time within criteria?	X		
Sample replicate present?	X		
Sample replicate within acceptance criteria?	X		

ESE BATCH : G20780

SAMPLE CODE	CLIENT ID
NACDLW2*8	FD#
NACDLW2*1	MW1
NACDLW2*2	MW2
NACDLW2*3	MW3
NACDLW2*4	MW4
NACDLW2*5	MW5
NACDLW2*6	MW6
NACDLW2*9	FLDBLK
NACDLW2*10	EQPBLK
NACDLW2*11	EQPBLK
NACDLW2*14	SW2
NACDLW2*15	SW3

Continuing Calibration Verification Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	TARGET	FOUND	%RECV	RECV CRIT
06/17/91	CCV*QC*1	900*TITR	HARDNESS	MG/L-CAC031000	1000	1000	100.0	85-115

Method Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND
06/17/91	MB*QC*1	900*TITR	HARDNESS	MG/L-CAC03ND	

Reference Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	KNOWN	FOUND	%RECV
06/17/91	RF*ERA*9929	900*TITR	HARDNESS	MG/L-CAC03338	336	336	99.4

Standard Matrix Spike Recovery Summary

DATE	SAMPLE	STORET	PARAMETER	%RECV	RECV CRIT	UNITS	TARGET	FOUND
06/17/91	SPI*QC*1	900*TITR	HARDNESS	100.0	85-115	MG/L-CAC031000	1000	1000

Sample Matrix Spike Recovery Summary

DATE	SAMPLE	STORET	PARAMETER	%RECV	RECV CRIT	UNSPIKED	UNITS	TARGET	FOUND
06/17/91	SPM1*NACDLW2*8	900*TITR	HARDNESS	100.0	85-115	328	MG/L-CAC03200	200	200
06/17/91	SPM2*NACDLW2*8	900*TITR	HARDNESS	100.0	85-115	328	MG/L-CAC03200	200	200

Computer QC Checks

"Exceptions"		
Yes	No	Comment / Corrective Action

Analysis holding time within criteria?

X

Extract holding time within criteria?

X

Method blank present?

X

Method blank within acceptance criteria?

X

Standard matrix spike present?

X

Standard matrix spike within acceptance criteria?

X

Sample matrix spike present?

X

Sample matrix spike within acceptance criteria?

X

ESE BATCH : G21091

SAMPLE CODE	CLIENT ID
NACDLW2*1	MW1
NACDLW2*2	MW2
NACDLW2*3	MW3
NACDLW2*4	MW4
NACDLW2*5	MW5
NACDLW2*6	MW6
NACDLW2*8	FD#
NACDLW2*9	FLDBLK
NACDLW2*10	EQPBLK
NACDLW2*11	EQPBLK
NACDLW2*14	SW2
NACDLW2*15	SW3

Continuing Calibration Verification Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	TARGET	FOUND	%RECV	RECV CRIT
06/27/91	CCV*QC*1	95*1	SPECIFIC COND.,LAB	UMHOS/CM	1410	1400	99.3	0-0

Method Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND
06/27/91	MB*QC*1	95*1	SPECIFIC COND.,LAB	UMHOS/CM	1.67

Reference Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	KNOWN	FOUND	%RECV
06/27/91	RF*01*1	95*1	SPECIFIC COND.,LAB	UMHOS/CM	1410	1400	99.3
06/27/91	RF*10*1	95*1	SPECIFIC COND.,LAB	UMHOS/CM	12900	12900	100.0

Replicate Analysis Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	REP #1	REP #2	RPD	RPD CRIT
06/27/91	RP*NACDLW2*8	95*1	SPECIFIC COND.,LAB	UMHOS/CM	918	929	1.19	15

Computer QC Checks

	"Exceptions"		Comment / Corrective Action
	Yes	No	
Analysis holding time within criteria?	X		
Extract holding time within criteria?	X		
Method blank present?	X		
Method blank within acceptance criteria?	X		
Sample replicate present?	X		
Sample replicate within acceptance criteria?	X		

ESE BATCH : 021150

SAMPLE CODE	CLIENT ID
NACDLW2*1	MW1
NACDLW2*2	MW2
NACDLW2*3	MW3
NACDLW2*4	MW4
NACDLW2*5	MW5
NACDLW2*6	MW6
NACDLW2*8	FD#
NACDLW2*9	FLDBLK
NACDLW2*11	EQPBLK
NACDLW2*10	EQPBLK
NACDLW2*14	SW2
NACDLW2*15	SW3

Continuing Calibration Verification Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	TARGET	FOUND	%RECV	RECV CRIT
06/19/91	CCV*QC*1	70353*1	TOX	UG/L-CL	230	230	100	73-125

Method Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND
06/19/91	MB*QC*1	70353*1	TOX	UG/L-CL	4

Standard Matrix Spike Recovery Summary

DATE	SAMPLE	STORET	PARAMETER	%RECV	RECV CRIT	UNITS	TARGET	FOUND
06/19/91	SP1*QC*1	70353*1	TOX	99	73-125	UG/L-CL	300	300

Sample Matrix Spike Recovery Summary

DATE	SAMPLE	STORET	PARAMETER	%RECV	RECV CRIT	UNSPIKED	UNITS	TARGET	FOUND
06/19/91	SPM*NACDLW2*8	70353*1	TOX	86	73-125	49	UG/L-CL	400	340
06/19/91	SPM2*NACDLW2*8	70353*1	TOX	90	73-125	49	UG/L-CL	400	360

Computer QC Checks

"Exceptions"		
Yes	No	Comment / Corrective Action
	X	

Analysis holding time within criteria?

Method blank present?

Method blank within acceptance criteria?

Standard matrix spike present?

Standard matrix spike within acceptance criteria?

Sample matrix spike present?

Sample matrix spike within acceptance criteria?

COMMENTS:

PROBLEM: *10,14,15 ANALYZED 1 DAY OUT OF HOLDING TIME.

EXPLANATION: PROBLEMS DURING ANALYTICAL RUN PREVENTED ALL SAMPLES BEING RUN WITHIN HOLDING TIME. SAMPLES WERE PRIORITIZED BY ANALYST TO RUN OLDEST SAMPLES FIRST; HOWEVER, THESE SAMPLES STILL EXCEEDED HT BY 1 DAY.

ESE BATCH : 021154

SAMPLE CODE	CLIENT ID
NACDLW2*1	MW1
NACDLW2*2	MW2
NACDLW2*3	MW3
NACDLW2*4	MW4
NACDLW2*5	MW5
NACDLW2*6	MW6
NACDLW2*8	FD#
NACDLW2*9	FLDBLK
NACDLW2*10	EQPBLK
NACDLW2*11	EQPBLK
NACDLW2*14	SW2
NACDLW2*15	SW3

Method Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND
06/27/91	MB*QC*1	680*1	CARBON, TOC	MG/L	0.4
06/27/91	MB*QC*2	680*1	CARBON, TOC	MG/L	ND
06/27/91	MB*QC*3	680*1	CARBON, TOC	MG/L	ND
06/27/91	MB*QC*4	680*1	CARBON, TOC	MG/L	ND

Reference Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	KNOWN	FOUND	%RECV
06/27/91	RF*ERA*9933	680*1	CARBON, TOC	MG/L	24.0	23.6	98.3

Standard Matrix Spike Recovery Summary

DATE	SAMPLE	STORET	PARAMETER	%RECV	RECV CRIT	UNITS	TARGET	FOUND
06/27/91	SP1*QC*1	680*1	CARBON, TOC	101	87-113	MG/L	20.0	20.1
06/27/91	SP2*QC*1	680*1	CARBON, TOC	96.5	87-113	MG/L	20.0	19.3
06/27/91	SP3*QC*1	680*1	CARBON, TOC	98.0	87-113	MG/L	20.0	19.6
06/27/91	SP4*QC*1	680*1	CARBON, TOC	93.5	87-113	MG/L	20.0	18.7

Sample Matrix Spike Recovery Summary

DATE	SAMPLE	STORET	PARAMETER	%RECV	RECV CRIT	UNSPIKED	UNITS	TARGET	FOUND
06/27/91	SPM1*NACDLW2*8	680*1	CARBON, TOC	101	87-113	4.1	MG/L	20.0	20.1
06/27/91	SPM2*NACDLW2*8	680*1	CARBON, TOC	101	87-113	4.1	MG/L	20.0	20.1

Computer QC Checks

	"Exceptions"	
	Yes	No Comment / Corrective Action
Analysis holding time within criteria?	X	
Extract holding time within criteria?	X	
Method blank present?	X	
Method blank within acceptance criteria?	X	
Standard matrix spike present?	X	
Standard matrix spike within acceptance criteria?	X	
Sample matrix spike present?	X	
Sample matrix spike within acceptance criteria?	X	

CHAIN OF CUSTODY

Environmental Science and Engineering 05-16-91

*** FIELD LOGSHEET ***

FIELD GROUP: NACDLW2

PROJECT NUMBER 3914022 0201

PROJECT NAME: NAVY - CD LANDFILL

LAB COORD. JEFF SHAMIS

RB 7/10

SE #	SITE/STA	HAZ?	FRACTIONS (CIRCLE)	DATE	TIME	PARAMETER LIST
*1	MW1		C N NF S XP XP	6-12-91	14:30	NACLDWA
*2	MW2		C N NF S XP XP	6-12-91	8:30	NACLDWA
*3	MW3		C N NF S XP XP	6-12-91	12:00	NACLDWA
*4	MW4		C N NF S XP XP	6-12-91	9:30	NACLDWA
*5	MW5		C N NF S XP XP			NACLDWA
*6	MW6		C N NF S XP XP			NACLDWA
*7	MWBG		C N NF S XP XP			NACLDWA
*8	FD#		C N NF S XP XP XP XP			NACLDWA
*9	FLDBLK		C N NF S XP XP	6-12-91	15:20	NACLDWA
*10	EQPBLK		C N NF S XP XP			NACLDWA
*11	EQPBLK		C N NF S XP XP			NACLDWA
*12	EQPBLK		C N NF S XP XP			NACLDWA
*13	SW1		C N NF S XP XP			NACLDWA
*14	SW2		C N NF S XP XP			NACLDWA
*15	SW3		C N NF S XP XP			NACLDWA
*16	SW4		C N NF S XP XP			NACLDWA
*17	SW5		C N NF S XP XP			NACLDWA
*18	SW6		C N NF S XP XP			NACLDWA

No Filter Metals Analysis Required

(source water)
(lab water)

Fed Ex # 0068401412

NOTE -CHANGE OR ENTER SITE ID AS NECESSARY; UP TO 9 ALPHANUMERIC CHARACTERS MAY BE USED
 -CIRCLE FRACTIONS COLLECTED. ENTER DATE, TIME, FIELD DATA (IF REQUIRED), HAZARD CODE AND NOTES
 -HAZARD CODES: I=IGNITABLE C-CORROSIVE R=REACTIVE T=TOXIC WASTE H=OTHER ACUTE HAZARD; IDENTIFY SPECIFICS IF KNOWN
 -PLEASE RETURN COMPLETED LOGSHEETS WITH SAMPLES TO Environmental Science and Engineering, Inc.

ELINQUISHED BY: (NAME/ORGANIZATION/DATE/TIME) VIA: REC'D BY (NAME/ORGANIZATION/DATE/TIME)

1 Andrew Faccert / ESE / 6-12-91 / 17:00

Fed Ex 11 PM 05 ESE 6-13 1200

2

3

SAMPLER: MORE SAMPLES TO BE SHIPPED? NO IF YES, ANTICIPATED # 1 TO SHIP ON 6/13
 SAMPLE CUSTODIAN: Custody Seals Intact? Y Samples Iced? Y Preservations Audited? Y Problems? N

Environmental Science and Engineering 05-16-91

*** FIELD LOGSHEET ***

FIELD GROUP: NACDLW2

PROJECT NUMBER 3914022 0201

PROJECT NAME: NAVY - CD LANDFILL

LAB COORD. JEFF SHAMIS

1/10

ESE #	SITE/STA	HAZ?	FRACTIONS(CIRCLE)					DATE	TIME	PARAMETER LIST	
*1	MW1		C	N	NF	S	XP	XP		NACLDWA	
*2	MW2		C	N	NF	S	XP	XP		NACLDWA	
*3	MW3		C	N	NF	S	XP	XP		NACLDWA	
*4	MW4		C	N	NF	S	XP	XP		NACLDWA	
*5	MW5		C	N	NF	S	XP	XP	6-12-91 11:15	NACLDWA	
*6	MW6		C	N	NF	S	XP	XP	6-12-91 10:05	NACLDWA	
*7	MWBG		C	N	NF	S	XP	XP		NACLDWA	
*8	FD#		C	N	NF	S	XP	XP	6-12-91	NACLDWA	
*9	FLDBLK		C	N	NF	S	XP	XP		NACLDWA	(source water)
*10	EQPBLK		C	N	NF	S	XP	XP		NACLDWA	(lab water)
*11	EQPBLK		C	N	NF	S	XP	XP	6-12-91 15:15	NACLDWA	
*12	EQPBLK		C	N	NF	S	XP	XP		NACLDWA	
*13	SW1		C	N	NF	S	XP	XP		NACLDWA	
*14	SW2		C	N	NF	S	XP	XP		NACLDWA	
*15	SW3		C	N	NF	S	XP	XP		NACLDWA	
*16	SW4		C	N	NF	S	XP	XP		NACLDWA	
*17	SW5		C	N	NF	S	XP	XP		NACLDWA	
*18	SW6		C	N	NF	S	XP	XP		NACLDWA	

No Filter Metal Analysis Required

(source water)
(lab water)
↓ ↓

Fed Ex # 0068401410

NOTE -CHANGE OR ENTER SITE ID AS NECESSARY; UP TO 9 ALPHANUMERIC CHARACTERS MAY BE USED
 -CIRCLE FRACTIONS COLLECTED. ENTER DATE, TIME, FIELD DATA (IF REQUIRED), HAZARD CODE AND NOTES
 -HAZARD CODES: I=IGNITABLE C=CORROSIVE R=REACTIVE T=TOXIC WASTE H=OTHER ACUTE HAZARD; IDENTIFY SPECIFICS IF KNOWN
 -PLEASE RETURN COMPLETED LOGSHEETS WITH SAMPLES TO Environmental Science and Engineering, Inc.

RELINQUISHED BY: (NAME/ORGANIZATION/DATE/TIME) VIA: REC'D BY (NAME/ORGANIZATION/DATE/TIME)

1 Andrew Forrest / ESE / 6-12-91 / 17:00

Fed Ex V. Poon Ods ESE 6-13 1200

2

3

SAMPLER: MORE SAMPLES TO BE SHIPPED? NO IF YES, ANTICIPATED # 1 TO SHIP ON 1/1
 SAMPLE CUSTODIAN: Custody Seals Intact? Y Samples Iced? Y Preservations Audited? Y Problems? N

Environmental Science and Engineering 05-16-91
PROJECT NUMBER 3914022 0201

*** FIELD LOGSHEET ***
PROJECT NAME: NAVY - CD LANDFILL

FIELD GROUP: NACDLW2
LAB COORD. JEFF SHAMIS

B 7/8

SE #	SITE/STA	HAZ?	FRACTIONS(CIRCLE)	DATE	TIME	PARAMETER LIST
*1	MW1		C N NF S XP XP			NACLDWA
*2	MW2		C N NF S XP XP			NACLDWA
*3	MW3		C N NF S XP XP			NACLDWA
*4	MW4		C N NF S XP XP			NACLDWA
*5	MW5		C N NF S XP XP			NACLDWA
*6	MW6		C N NF S XP XP			NACLDWA
*7	MWBG		C N NF S XP XP			NACLDWA
*8	FD#		C N NF S XP XP XP XP			NACLDWA
*9	FLDBLK		C N NF S XP XP			NACLDWA (source water)
*10	EQPBLK		C N NF S XP XP	6-10-91	17:00	NACLDWA (lab water)
*11	EQPBLK		C N NF S XP XP			NACLDWA
*12	EQPBLK		C N NF S XP XP			NACLDWA
*13	SW1		C N NF S XP XP			NACLDWA
*14	SW2		C N NF S XP XP	6-10-91	14:30	NACLDWA * No Filter Metal Analysis
*15	SW3		C N NF S XP XP	6-10-91	14:00	NACLDWA * Required
*16	SW4		C N NF S XP XP			NACLDWA
*17	SW5		C N NF S XP XP			NACLDWA
*18	SW6		C N NF S XP XP			NACLDWA

NOTE -CHANGE OR ENTER SITE ID AS NECESSARY; UP TO 9 ALPHANUMERIC CHARACTERS MAY BE USED
-CIRCLE FRACTIONS COLLECTED. ENTER DATE, TIME, FIELD DATA (IF REQUIRED), HAZARD CODE AND NOTES
-HAZARD CODES: I=IGNITABLE C=CORROSIVE R=REACTIVE T=TOXIC WASTE H=OTHER ACUTE HAZARD; IDENTIFY SPECIFICS IF KNOWN
-PLEASE RETURN COMPLETED LOGSHEETS WITH SAMPLES TO Environmental Science and Engineering, Inc.

ELINQUISHED BY: (NAME/ORGANIZATION/DATE/TIME) VIA: REC'D BY (NAME/ORGANIZATION/DATE/TIME)

1 Andrew M. Forrest / ESE / 6-10-91 / 18:00 Fed Ex V. Prem O'd ESE 6-11 1230

2

3

SAMPLER: MORE SAMPLES TO BE SHIPPED? ☒ IF YES, ANTICIPATED # 8 TO SHIP ON 6/12/91
SAMPLE CUSTODIAN: Custody Seals Intact? ☒ Samples Iced? ☒ Preservations Audited? ☒ Problems? ☒

Temp @ 4°C
(WRD)

8 monitor well samples + QC

AIRMAIL # 0068403016

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			S06U
PARAMETERS		STORET	NACDLS
	UNITS	METHOD	13
DATE			02/26/91
TIME			07:35
PH, SED		70310	6.6
	STD. UNITS	I	
TOX, SED		99263	62
	UG/KG-DRY	I	

SAMPLE INDENTIFICATION CROSS-REFERENCE

FIELD GROUP NACDLB

SITE ID	ESE ID
FLDBLK	NACDLB*1
EQPBLK	NACDLB*4

FIELD GROUP NACDLS1

SITE ID	ESE ID
S01U	NACDLS*1
S01L	NACDLS*2
S02U	NACDLS*3
S02L	NACDLS*4
S03U	NACDLS*5
S03L	NACDLS*6
S04U	NACDLS*7
S04L	NACDLS*8
S05U	NACDLS*9
S05L	NACDLS*10
FD#1	NACDLS*11
S06L	NACDLS*12
S06U	NACDLS*13
SE1	NACDLS*14
SE2	NACDLS*15
SE3	NACDLS*16
SE4	NACDLS*17
SE5	NACDLS*18

FIELD GROUP NACLDW1

SITE ID	ESE ID
MW1	NACLDW1*1
MW2	NACLDW1*2
MW3	NACLDW1*3
MW4	NACLDW1*4
MW5	NACLDW1*5
MW6	NACLDW1*6
FD#1	NACLDW1*8
FLDBLK	NACLDW1*9
EQPBLK	NACLDW1*10
EQPBLK	NACLDW1*11
SW2	NACLDW1*14
SW3	NACLDW1*15
SW4	NACLDW1*16

QC PROBLEMS / CORRECTIVE ACTIONS

QC OUTLIERS

The Sample Matrix spikes for NACLDW1*1 for Fe exceeded criteria (77-113% recovery) @ 136-220% recoveries due to the spiking level being insignificant relative to the unusually high background values for this sample. No significance is suggested for the unspiked data.

ANALYTICAL SERVICES
QUALITY ASSURANCE CORRECTIVE ACTION FORM

1. Individual identifying the problem: Jeff Shamis
Nature of problem: Sample QC for recent Navy LP-20 and CD Landfill field groups was not performed on designated field duplicates as required for Navy samples. This occurred for all metals analyses, and for % moisture RP for NACLPS1, pH and hardness for NACLQW1, and % moisture, pH, and TOX for NACDLS
Signature: Jeff Shamis Date relinquished: _____
2. Individual determining corrective action: Jeff Shamis Date received: _____
Action to be taken: This requirement will be reiterated and highlighted to the analytical department managers and their staff.
Signature: Jeff Shamis Date relinquished: _____
3. Individual responsible for implementing action: Jeff Shamis Date received: _____
Signature: Jeff Shamis Date implemented: 4/18/91
4. Individual responsible for assuring the effectiveness of the action: Portia Pisigan, QA/QC
Action taken to assure effectiveness: Assess that lab staff have knowledge and understanding of this requirement

Corrective action status: _____ Acceptable _____ Unacceptable
Signature: _____ Date: _____

cc: KWB
KKA

PREPARATION AND ANALYSIS HOLDING TIME EXCEEDANCE REPORT

REPORT DATE:04/17/91

SAMPLE	BATCH	STORET	PARAMETER	DAYS EXCEEDED	FOOTNOTES
NACDLB*1	G18558	403*I	PH,LAB	1	1
NACDLB*4	G18558	403*I	PH,LAB	1	1
NACDLS*1	G18659	70310*I	PH,SED	6	2
NACDLS*2	G18659	70310*I	PH,SED	6	2
NACDLS*3	G18659	70310*I	PH,SED	6	2
NACDLS*4	G18659	70310*I	PH,SED	6	2
NACDLS*5	G18658	70310*I	PH,SED	4	2
NACDLS*6	G18658	70310*I	PH,SED	4	2
NACDLS*7	G18659	70310*I	PH,SED	5	2
NACDLS*8	G18659	70310*I	PH,SED	5	2
NACDLS*9	G18516	70310*I	PH,SED	4	2
NACDLS*10	G18516	70310*I	PH,SED	4	2
NACDLS*11	G18659	70310*I	PH,SED	5	2
NACDLS*12	G18659	70310*I	PH,SED	5	2
NACDLS*13	G18659	70310*I	PH,SED	5	2
NACDLS*14	G18516	70310*I	PH,SED	4	2
NACDLS*15	G18516	70310*I	PH,SED	4	2
NACDLS*16	G18516	70310*I	PH,SED	4	2
NACDLS*17	G18516	70310*I	PH,SED	4	2
NACDLS*18	G18516	70310*I	PH,SED	4	2
NACLDW1*8	G19294	70353*I	TOX	9	3
NACLDW1*11	G19294	70353*I	TOX	8	3

FOOTNOTES:

- 1 - ANALYZED WITHIN 24 HRS OF RECEIPT FROM FIELD.
- 2 - HOLDING TIME AS GUIDANCE ONLY FOR SOIL/SED MATRICES
- 3 - UNFORSEEN INSTRUMENT FAILURE AND DELAYED REPAIRS CREATED EXCESS BACKLOG OF SAMPLES FOR TOX. THESE FIELD QC SAMPLES WERE WITHHELD FROM ANALYSIS TO ALLOW THE OTHER ENVIRONMENTAL SAMPLES TO BE ANALYZED WITHIN HOLDING TIMES.

DATA SUMMARIES

pH & TOX, NACDLS

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			SO1U
PARAMETERS		STORET	NACDLS
	UNITS	METHOD	
DATE			02/25/91
TIME			16:35
PH, SED		70310	6.7
	STD.UNITS	I	
TOX, SED		99263	19
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S PARAMETERS	UNITS	STORET METHOD	SOIL NACDLS
DATE			02/25/91
TIME			16:30
PH,SED		70310	6.8
	STD.UNITS	I	
TOX,SED		99263	3
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S
PARAMETERS

UNITS

STORET
METHOD

SO2U
NACDLS
3

DATE
TIME

02/25/91
13:15

PH, SED

STD. UNITS

70310
I

6.4

TOX, SED

UG/KG-DRY

99263
I

21

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			SO2L
PARAMETERS		STORET	NACDLS
	UNITS	METHOD	

DATE			02/25/91
TIME			13:10

PH,SED		70310	6.6
	STD.UNITS	I	
TOX,SED		99263	44
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			S03U
PARAMETERS		STORET	NACDLS
	UNITS	METHOD	

DATE			02/22/91
TIME			11:50

PH,SED		70310	6.9
	STD.UNITS	I	
TOX,SED		99263	23
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			S03L
PARAMETERS		STORET	NACDLS
	UNITS	METHOD	
DATE			02/22/91
TIME			12:00
PH, SED		70310	5.0
	STD. UNITS	I	
TOX, SED		99263	10
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S
PARAMETERS
UNITS

STORET
METHOD

SO4U
NACDLS
7

DATE
TIME

02/26/91
18:30

PH,SED

STD.UNITS

70310

6.6

TOX,SED

UG/KG-DRY

99263

78

I
I

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			SO4L
PARAMETERS		STORET	NACDLS
	UNITS	METHOD	
DATE			02/26/91
TIME			18:45
PH, SED		70310	6.7
	STD. UNITS	I	
TOX, SED		99263	64
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			S05U
PARAMETERS		STORET	NACDLS
	UNITS	METHOD	

DATE			02/20/91
TIME			16:15

PH, SED		70310	6.6
	STD. UNITS	I	
TOX, SED		99263	40
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S
PARAMETERS
UNITS

STORET
METHOD

S05L
NACDLS
10

DATE
TIME

02/20/91
16:30

PH, SED

70310

6.8

STD. UNITS

I

TOX, SED

99263

35

UG/KG-DRY

I

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S
PARAMETERS

UNITS

STORET
METHOD

FD#1
NACDLS
11

DATE
TIME

02/26/91
16:35

PH, SED

STD. UNITS

70310

6.8

I

TOX, SED

UG/KG-DRY

99263

I

~~HL~~

71

B

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S
PARAMETERS
UNITS

STORET
METHOD
S06L
NACDLS
12

DATE
TIME

02/26/91
07:40

PH, SED

STD. UNITS

70310

6.8

TOX, SED

UG/KG-DRY

99263

9

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S
PARAMETERS

UNITS

STORET
METHOD

SE1
NACDLS
14

DATE
TIME

02/20/91

PH, SED

STD. UNITS

70310

7.5

TOX, SED

UG/KG-DRY

99263

2

I

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			SE2
PARAMETERS		STORET	NACDLS
	UNITS	METHOD	
DATE			02/20/91
TIME			09:45
PH, SED		70310	6.8
	STD. UNITS	I	
TOX, SED		99263	440
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S
PARAMETERS
UNITS

SE3
NACDLS
STORET
METHOD 16

DATE
TIME

02/20/91
08:30

PH, SED

70310

6.5

STD. UNITS

I

TOX, SED

99263

1400

UG/KG-DRY

I

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S PARAMETERS	UNITS	STORET METHOD	SE4 NACDLS 17
DATE			02/20/91
TIME			11:30
PH, SED		70310	6.9
	STD. UNITS	I	
TOX, SED		99263	10
	UG/KG-DRY	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLS

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S
PARAMETERS

UNITS

STORET
METHOD

SE5
NACDLS
18

DATE
TIME

02/20/91
11:10

PH, SED

70310

6.8

STD.UNITS

I

TOX, SED

99263

40

UG/KG-DRY

I

QC SUMMARY FOR NACDLS FOR NON-CLP FORM ANALYTES

Method Blank Sample Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	FOUND
G18516	02/25/91	MB*NONE*1	70310*I	PH,SED	STD.UNITS	6.3
G18658	02/27/91	MB*NONE*1		PH,SED	STD.UNITS	6.3
G18659	03/04/91	MB*NONE*1		PH,SED	STD.UNITS	6.6
G18582	02/27/91	MB*NONE*1	99263*I	TOX,SED	UG/KG-DRY	0.2
G18933	03/01/91	MB*NONE*1		TOX,SED	UG/KG-DRY	ND

Replicate Analysis Sample Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	REP1	REP2	RPD	MAX RPD
G18516	02/25/91	NACDLS*15	70310*I	PH,SED	SU	6.8	6.8	0.0	20
G18658	02/27/91	NACDLS*5		PH,SED	SU	6.9	6.9	0.0	20
G18659	03/04/91	NACDLS*1		PH,SED	SU	6.7	6.7	0.0	20
G18582	02/27/91	NACDLS*4	99263*I	TOX,SED	UG/KG	44	47	7	20

Standard Matrix Spike Recovery Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	%R	%R CRIT
G18582	02/27/91	SP1*NONE*1	99263*I	TOX,SED	UG/KG-DRY	100	64-136
G18933	03/01/91	SP1*NONE*1		TOX,SED	UG/KG-DRY	90	64-136
		SP2*NONE*1		TOX,SED	UG/KG-DRY	92	64-136

Sample Matrix Spike Recovery Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	%R	%R CRIT	UNSPIKED
G18582	02/27/91	SPM1*NACDLS*5	99263*I	TOX	UG/KG	70	64-136	23
		SPM2*NACDLS*5		TOX	UG/KG	92	64-136	23
G18933	03/01/91	SPM*NACDLS*13		TOX	UG/KG	100	64-136	62
		SPM2*NACDLS*13		TOX	UG/KG	75	64-136	62

DATA SUMMARIES

METALS, NACDLS*1-18

U. S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG.No.: NACDLS

SOW No. 7/88

EPA Sample No.	Lab Sample ID
FD#	NALPS1*13
FD#1	NACDLS*11
SE1	NACDLS*14
SE2	NACDLS*15
SE3	NACDLS*16
SE4	NACDLS*17
SE5	NACDLS*18
SO1L	NACDLS*2
SO1LD	RP*NACDLS*2
SO1U	NACDLS*1
SO1US	SPM1*NACDLS*1
SO1US	SPM2*NACDLS*1
SO2L	NACDLS*4
SO2U	NACDLS*3
SO3L	NACDLS*6
SO3U	NACDLS*5
SO4L	NACDLS*8
SO4U	NACDLS*7
SO5L	NACDLS*10
SO5U	NACDLS*9
SO6L	NACDLS*12
SO6U	NACDLS*13
SW1-1	NALPS1*1

Were ICP interelement corrections applied?

Yes/No Y

Were ICP background corrections applied?

Yes/No Y

If yes, were raw data generated before
application of background corrections?

Yes/No

Comments: _____

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____

Name: _____

Date: _____

Title: _____

COVER PAGE - IN

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S01U

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*1

Level (low/med):

Date Received: 02/27/91

% Solids:

88.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.32	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	8062.03			P
7439-92-1	Lead	15.54			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SO1L

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*2

Level (low/med):

Date Received: 02/27/91

% Solids:

87.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.33	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	4304.49			P
7439-92-1	Lead	5.19	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S02U

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*3

Level (low/med):

Date Received: 02/27/91

% Solids:

88.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.38	B		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	6591.82			P
7439-92-1	Lead	11.77			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S02L

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*4

Level (low/med):

Date Received: 02/27/91

% Solids:

82.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.33	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	2748.56			P
7439-92-1	Lead	5.22	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S03U

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*5

Level (low/med):

Date Received: 02/25/91

% Solids:

86.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.34	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	4155.38			P
7439-92-1	Lead	15.61			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S03L

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*6

Level (low/med):

Date Received: 02/25/91

% Solids:

83.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.33	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	4804.89			P
7439-92-1	Lead	5.18	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S04U

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*7

Level (low/med):

Date Received: 02/27/91

% Solids:

75.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	28.36			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	142293.29			P
7439-92-1	Lead	4144.89			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S04L

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*8

Level (low/med):

Date Received: 02/27/91

% Solids:

74.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.63			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	12220.35			P
7439-92-1	Lead	48.37			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S05U

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*9

Level (low/med):

Date Received: 02/21/91

% Solids:

92.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.29	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	2879.31			P
7439-92-1	Lead	10.68			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S05L

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*10

Level (low/med):

Date Received: 02/21/91

% Solids:

85.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.34	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	1934.11			P
7439-92-1	Lead	5.30	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

FD#1

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*11

Level (low/med):

Date Received: 02/27/91

% Solids:

77.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.95			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	1468.41			P
7439-92-1	Lead	44.54			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S06L

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*12

Level (low/med):

Date Received: 02/27/91

% Solids:

82.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.68			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	10635.77			P
7439-92-1	Lead	43.28			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

S06U

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*13

Level (low/med):

Date Received: 02/27/91

% Solids:

84.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.60			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	8906.53			P
7439-92-1	Lead	56.00			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SE1

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*14

Level (low/med):

Date Received: 02/21/91

% Solids:

83.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.65			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	6931.25			P
7439-92-1	Lead	19.70			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SE2

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*15

Level (low/med):

Date Received: 02/21/91

% Solids: 32.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	1.40			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	56860.55			P
7439-92-1	Lead	21.18			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SE3

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*16

Level (low/med):

Date Received: 02/21/91

% Solids:

23.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.03			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	93724.65			P
7439-92-1	Lead	26.73			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SE4

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*17

Level (low/med):

Date Received: 02/21/91

% Solids:

76.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	0.45	B		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	4856.66			P
7439-92-1	Lead	18.73			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SE5

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): SOIL

Lab Sample ID: NACDLS*18

Level (low/med):

Date Received: 02/21/91

% Solids:

83.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	4.94			P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	15627.62			P
7439-92-1	Lead	145.23			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: ICV,CCV

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony	1000.0	974.73	97.5	500.0	509.50	101.9	509.00	101.8	P
Arsenic	50.0	54.00	108.0	50.0	49.70	99.4	50.60	101.2	F
Barium									
Beryllium	1000.0	994.46	99.4	500.0	512.17	102.4	512.17	102.4	P
Cadmium	1000.0	970.81	97.1	500.0	502.50	100.5	508.93	101.8	P
Calcium									
Chromium	1000.0	993.57	99.4	500.0	500.30	100.1	505.66	101.1	P
Cobalt									
Copper	1000.0	986.83	98.7	500.0	513.30	102.7	507.51	101.5	P
Iron	1000.0	1029.43	102.9	5000.0	5150.00	103.0	5155.21	103.1	P
Lead	1000.0	971.50	97.2	500.0	493.00	98.6	486.20	97.2	P
Magnesium									
Manganese									
Mercury	5.0	4.98	99.6	5.0	5.07	101.4	4.89	97.8	CV
Nickel	1000.0	986.51	98.7	500.0	497.70	99.5	504.74	100.9	P
Potassium									
Selenium	124.0	129.00	104.0	50.0	49.30	98.6	48.70	97.4	F
Silver	1000.0	1024.65	102.5	500.0	516.00	103.2	519.96	104.0	P
Sodium									
Thallium	1000.0	988.22	98.8	700.0	696.80	99.5	694.66	99.2	P
Vanadium									
Zinc	1000.0	975.91	97.6	500.0	504.40	100.9	502.90	100.6	P
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: ICV,CCV

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony				500.0	518.15	103.6	500.77	100.2	P
Arsenic				50.0	52.80	105.6	49.90	99.8	F
Barium									
Beryllium				500.0	508.73	101.7	491.53	98.3	P
Cadmium				500.0	504.72	100.9	489.21	97.8	P
Calcium									
Chromium				500.0	502.84	100.6	485.86	97.2	P
Cobalt									
Copper				500.0	511.78	102.4	477.74	95.5	P
Iron				5000.0	5087.51	101.8	4871.21	97.4	P
Lead				500.0	518.60	103.7	490.02	98.0	P
Magnesium									
Manganese									
Mercury				10.0	9.33	93.3			CV
Nickel				500.0	493.04	98.6	478.16	95.6	P
Potassium									
Selenium				50.0	48.80	97.6	49.90	99.8	F
Silver				500.0	519.76	104.0	502.41	100.5	P
Sodium									
Thallium				700.0	699.31	99.9	712.49	101.8	P
Vanadium									
Zinc				500.0	513.17	102.6	485.50	97.1	P
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: ICV,CCV

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony				500.0	506.42	101.3	511.08	102.2	P
Arsenic				50.0	49.10	98.2			F
Barium									
Beryllium				500.0	508.74	101.7	507.59	101.5	P
Cadmium				500.0	507.16	101.4	506.72	101.3	P
Calcium									
Chromium				500.0	501.51	100.3	500.01	100.0	P
Cobalt									
Copper				500.0	497.56	99.5	496.64	99.3	P
Iron				5000.0	5066.12	101.3	5061.44	101.2	P
Lead				500.0	516.95	103.4	499.93	100.0	P
Magnesium									
Manganese									
Mercury									
Nickel				500.0	493.75	98.8	501.55	100.3	P
Potassium									
Selenium				50.0	48.60	97.2			F
Silver				500.0	517.90	103.6	518.11	103.6	P
Sodium									
Thallium				700.0	679.31	97.0	683.54	97.6	P
Vanadium									
Zinc				500.0	498.14	99.6	502.51	100.5	P
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium	1000.0	964.00	96.4	500.0	498.00	99.6	476.00	95.2	P
Calcium									
Chromium									
Cobalt									
Copper									
Iron	1000.0	1013.00	101.3	5000.0	5074.00	101.5	5013.00	100.3	P
Lead	1000.0	976.00	97.6	500.0	467.00	93.4	460.00	92.0	P
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

3
BLANKS

Lab Name: ESE

Contract: NAVY

Lab Code: ICB, CCB

Case No.:

SAS No.:

SDG.No.:

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			1	C	2	C	3	C			
Aluminum											
Antimony	40.0	U	40.0	U	40.0	U	40.0	U	4.00	U	P
Arsenic	2.6	U	2.6	U	2.6	U	2.6	U	0.260	U	F
Barium											
Beryllium	1.3	U	1.3	U	1.3	U	1.3	U	0.130	U	P
Cadmium	3.0	U	3.0	U	3.0	U	3.0	U	0.300	U	P
Calcium											
Chromium	5.7	U	5.7	U	5.7	U	5.7	U	0.570	U	P
Cobalt											
Copper	5.8	U	5.8	U	13.2	B	5.8	U	0.580	U	P
Iron	12.0	U	12.0	U	14.8	B	12.0	U	1.20	U	P
Lead	47.0	U	47.0	U	47.0	U	47.0	U	4.70	U	P
Magnesium											
Manganese											
Mercury			0.2	U	0.2	U			0.020	U	CV
Nickel	14.0	U	14.0	U	14.0	U	14.0	U	1.40	U	P
Potassium											
Selenium	2.1	U	2.1	U	2.1	U	2.1	U	0.210	U	F
Silver	4.9	U	4.9	U	8.0	B	4.9	U	0.700	B	P
Sodium											
Thallium	176.0	U	176.0	U	176.0	U	176.0	U	17.6	U	P
Vanadium											
Zinc	5.6	U	5.6	U	9.4	B	5.6	U	0.560	U	P
Cyanide											

U.S. EPA - CLP

3
BLANKS

Lab Name: ESE

Contract: NAVY

Lab Code: ICB, CCB

Case No.:

SAS No.:

SDG.No.:

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			1	C	2	C	3	C			
Aluminum											
Antimony			40.0	U	40.0	U			4.00	U	P
Arsenic			2.6	U	2.6	U					F
Barium											
Beryllium			1.3	U	1.3	U			0.130	U	P
Cadmium			3.0	U	3.0	U			0.300	U	P
Calcium											
Chromium			5.7	U	5.7	U			0.570	U	P
Cobalt											
Copper			5.8	U	5.8	U			0.580	U	P
Iron			12.0	U	12.0	U			1.20	U	P
Lead			47.0	U	47.0	U			4.70	U	P
Magnesium											
Manganese											
Mercury											
Nickel			14.0	U	14.0	U			1.40	U	P
Potassium											
Selenium			2.1	U	2.1	U					F
Silver			4.9	U	4.9	U			0.490	U	P
Sodium											
Thallium			176.0	U	176.0	U			17.6	U	P
Vanadium											
Zinc			5.6	U	5.6	U			0.560	U	P
Cyanide											

U.S. EPA - CLP

3
BLANKS

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG.No.:

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			1	C	2	C	3	C			
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium	3.0	U	3.0	U							P
Calcium											
Chromium											
Cobalt											
Copper											
Iron	12.0	U	12.0	U							P
Lead	47.0	U	47.0	U							P
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: ICS

Case No.:

SAS No.:

SDG.No.:

ICP ID Number: JA1100CLP

ICS Source:

Concentration Units: UG/L

Analyte	True		Initial Found			Final Found		
	Sol. A	Sol. AB	Sol. A	Sol. AB	%R	Sol. A	Sol. AB	%R
Aluminum								
Antimony		1000		979.0	97.9		997.5	99.8
Arsenic								
Barium								
Beryllium		500		511.0	102.2		512.1	102.4
Cadmium		1000		977.7	97.8		985.7	98.6
Calcium								
Chromium		1000		990.6	99.1		1007.4	100.7
Cobalt								
Copper		500		491.7	98.3		485.4	97.1
Iron		20000		19443.9	97.2		19299.6	96.5
Lead		5000		4792.9	95.9		4849.3	97.0
Magnesium								
Manganese								
Mercury								
Nickel		1000		937.2	93.7		950.7	95.1
Potassium								
Selenium								
Silver		500		494.1	98.8		505.5	101.1
Sodium								
Thallium		1000		982.6	98.3		947.4	94.7
Vanadium								
Zinc		1000		973.5	97.4		977.2	97.7

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code:

Case No.:

SAS No.:

SDG.No.:

ICP ID Number: JA1100CLP

ICS Source:

Concentration Units: UG/L

Analyte	True		Initial Found			Final Found		
	Sol. A	Sol. AB	Sol. A	Sol. AB	%R	Sol. A	Sol. AB	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium		1000		968.0	96.8		956.0	95.6
Calcium								
Chromium								
Cobalt								
Copper								
Iron		20000		19546.0	97.7		19470.0	97.4
Lead		5000		4668.0	93.4		4646.0	92.9
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

S01US MS

Lab Code: SPM1

Case No.:

SAS No.:

NA COLS*1
SDG.No.:

Matrix (soil/water): SOIL

Level (low/med):

% Solids for Sample: 88.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									P
Arsenic									
Barium									
Beryllium									P
Cadmium	75-125	5.0131		0.3039	U	5.06	99.1		P
Calcium									
Chromium									P
Cobalt									
Copper									P
Iron		7840.7068		8062.0265		101.29	-218.5		P
Lead	75-125	51.6208		15.5430		50.65	71.2	N	P
Magnesium									
Manganese									
Mercury									
Nickel									P
Potassium									
Selenium									
Silver									P
Sodium									
Thallium									P
Vanadium									
Zinc									P
Cyanide									

Comments:

U.S. EPA - CLP
5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

SO1US

Lab Code: SPM2

Case No.:

SAS No.:

MS/D
NACDLS*1
SDG.No.:

Matrix (soil/water): SOIL

Level (low/med):

% Solids for Sample: 88.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									P
Arsenic									
Barium									
Beryllium									P
Cadmium	75-125	5.3795		0.3217	U	5.36	100.4		P
Calcium									
Chromium									P
Cobalt									
Copper									P
Iron		8243.3743		8062.0265		107.25	169.1		P
Lead	75-125	55.6285		15.5430		53.62	74.8	N	P
Magnesium									
Manganese									
Mercury									
Nickel									P
Potassium									
Selenium									
Silver									P
Sodium									
Thallium									P
Vanadium									
Zinc									P
Cyanide									

Comments:

U.S. EPA - CLP

5A

SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

SW1-1S

Lab Code: SPM1

Case No.:

SAS No.:

NALPS1*

SDG.No.:

Matrix (soil/water): SOIL

Level (low/med):

% Solids for Sample: 86.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony	75-125	60.3798		16.1649		53.56	82.6		P
Arsenic		19.4645		20.9036		2.25	-64.0		F
Barium									
Beryllium	75-125	4.6984		0.1393	U	5.36	87.7		P
Cadmium	75-125	5.1119		0.3213	U	5.36	95.4		P
Calcium									
Chromium		148.5923		111.8908		21.42	171.3		P
Cobalt									
Copper	75-125	24.7840		2.3623		26.78	83.7		P
Iron									P
Lead	75-125	43.5980		5.0348	U	53.56	81.4		P
Magnesium									
Manganese									
Mercury	75-125	2.8949		0.0110	U	2.76	104.9		CV
Nickel	75-125	38.5600		4.9036		42.85	78.5		P
Potassium									
Selenium	75-125	0.7547		0.2366	U	2.25	33.5	N	F
Silver	75-125	4.0053		0.5249	U	5.36	74.7	N	P
Sodium									
Thallium	75-125	99.6382		20.2464		107.12	74.1	N	P
Vanadium									
Zinc	75-125	37.8851		24.0889		21.42	64.4	N	P
Cyanide									

Comments:

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

SW1-1S

MS/D

Lab Code: SPM2

Case No.:

SAS No.:

NALP51*1
SDG.No.:

Matrix (soil/water): SOIL

Level (low/med):

% Solids for Sample: 86.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony	75-125	69.0505		16.1649		56.89	93.0		P
Arsenic		22.5715		20.9036		2.18	76.5		F
Barium									
Beryllium	75-125	5.6419		0.1479	U	5.69	99.2		P
Cadmium	75-125	5.8831		0.3413	U	5.69	103.4		P
Calcium									
Chromium		154.2893		111.8908		22.75	186.4		P
Cobalt									
Copper	75-125	27.6370		2.3623		28.44	88.9		P
Iron									P
Lead	75-125	53.2592		5.3477	U	56.89	93.6		P
Magnesium									
Manganese									
Mercury	75-125	2.5522		0.0099	U	2.47	103.3		CV
Nickel	75-125	40.8230		4.9036		45.51	78.9		P
Potassium									
Selenium	75-125	0.6645		0.2288	U	2.18	30.5	N	F
Silver	75-125	4.8648		0.5575	U	5.69	85.5		P
Sodium									
Thallium	75-125	112.7985		20.2464		113.77	81.4		P
Vanadium									
Zinc	75-125	37.7717		24.0889		22.75	60.1	N	P
Cyanide									

Comments:

U.S. EPA - CLP

5B
POST DIGEST SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

S01UA

Lab Code: SPX

Case No.:

SAS No.:

NACDLS*1
SDG.No.:

Matrix (soil/water): SOIL

Level (low/med):

Concentration Units: MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									P
Arsenic									
Barium									
Beryllium									P
Cadmium		487.28		3.00	U	500.0	97.5		P
Calcium									
Chromium									P
Cobalt									
Copper									P
Iron		81949.84		75993.75		5000.0	119.1		P
Lead		289.08		146.51		500.0	86.3		P
Magnesium									
Manganese									
Mercury									
Nickel									P
Potassium									
Selenium									
Silver									P
Sodium									
Thallium									P
Vanadium									
Zinc									P

Comments:

U.S. EPA - CLP

5B

POST DIGEST SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

SW1-1A

Lab Code: SPX

Case No.:

SAS No.:

NALPS1*1
SDG.No.:

Matrix (soil/water): SOIL

Level (low/med):

Concentration Units: MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver		501.16		4.90	U	500.0	100.2		P
Sodium									
Thallium		788.52		178.78		700.0	87.1		P
Vanadium									
Zinc		697.94		212.71		500.0	97.0		P

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

S01LD

RP

Lab Code:

Case No.:

SAS No.:

NACDL 57 Z
SDG.No.:

Matrix (soil/water): SOIL

Level (low/med):

% Solids for Sample: 87.6

% Solids for Duplicate: 87.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								P
Arsenic								
Barium								
Beryllium								P
Cadmium		0.3315	U	0.3023	U			P
Calcium								
Chromium								P
Cobalt								
Copper								P
Iron		4304.4885		4603.0651		6.7		P
Lead		5.1938	U	4.7364	U			P
Magnesium								
Manganese								
Mercury								
Nickel								P
Potassium								
Selenium								
Silver								P
Sodium								
Thallium								P
Vanadium								
Zinc								P
Cyanide								

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6
DUPLICATES

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

SW1-2D

RP

Lab Code:

Case No.:

SAS No.:

NALPS 1 + 2
SDG.No.:

Matrix (soil/water): SOIL

Level (low/med):

% Solids for Sample: 85.8

% Solids for Duplicate: 85.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony		4.4612	U	4.0441	U			P
Arsenic		1.9114		1.9519		2.1		F
Barium								
Beryllium		0.1450	U	0.1314	U			P
Cadmium		0.3346	U	0.3033	U			P
Calcium								
Chromium		7.6756		6.6201		14.8		P
Cobalt								
Copper		4.1969		3.7731		10.6		P
Iron								P
Lead		9.7746		7.2035		30.3	*	P
Magnesium								
Manganese								
Mercury		0.1047	U	0.1150	U			CV
Nickel		4.7390		4.0087		16.7		P
Potassium								
Selenium		0.2347	U	0.2329	U			F
Silver		0.5465	U	0.4954	U			P
Sodium								
Thallium		19.6290	U	17.7940	U			P
Vanadium								
Zinc		16.4564		14.7821		10.7		P
Cyanide								

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7

LABORATORY CONTROL SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: SP1

Case No.:

SAS No.:

SDG.No.:

Solid LCS Source:

Aqueous LCS Source:

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Aluminum								
Antimony	500.0	499.85	100.0					
Arsenic	20.0	22.10	110.5					
Barium								
Beryllium	50.0	48.49	97.0					
Cadmium	50.0	50.82	101.6					
Calcium								
Chromium	200.0	205.23	102.6					
Cobalt								
Copper	250.0	244.61	97.8					
Iron	1000.0	1014.28	101.4					
Lead	500.0	496.07	99.2					
Magnesium								
Manganese								
Mercury	5.0	5.24	104.8					
Nickel	400.0	385.02	96.3					
Potassium								
Selenium	20.0	21.30	106.5					
Silver	50.0	51.64	103.3					
Sodium								
Thallium	1000.0	1011.44	101.1					
Vanadium								
Zinc	200.0	201.14	100.6					
Cyanide								

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: SP2

Case No.:

SAS No.:

SDG.No.:

Solid LCS Source:

Aqueous LCS Source:

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Aluminum								
Antimony	500.0	496.99	99.4					
Arsenic								
Barium								
Beryllium	50.0	47.34	94.7					
Cadmium	50.0	49.49	99.0					
Calcium								
Chromium	200.0	199.89	99.9					
Cobalt								
Copper	250.0	245.72	98.3					
Iron	1000.0	996.81	99.7					
Lead	500.0	494.38	98.9					
Magnesium								
Manganese								
Mercury								
Nickel	400.0	379.70	94.9					
Potassium								
Selenium								
Silver	50.0	46.48	93.0					
Sodium								
Thallium	1000.0	997.80	99.8					
Vanadium								
Zinc	200.0	199.42	99.7					
Cyanide								

DATA SUMMARIES

pH & TOX, NACDLB

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLB

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S PARAMETERS	UNITS	STORET METHOD	FLDBLK NACDLB
			1
DATE TIME			02/22/91 15:00
PH, LAB		403	5.45
	STD UNITS	I	
TOX		70353	<10
	UG/L-CL	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACDLB

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			EQPBLK
PARAMETERS		STORET	NACDLB
UNITS		METHOD	

DATE		02/22/91	
TIME		13:00	

PH, LAB		403	5.39
	STD UNITS	I	
TOX		70353	<10
	UG/L-CL	I	

QC SUMMARY FOR NACDLB FOR NON-CLP FORM ANALYTES

Method Blank Sample Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	FOUND
G18558	02/25/91	MB*NONE*1	403*I	PH,LAB	SU	6.10
G19137	02/28/91	MB*NONE*1	70353*I	TOX	UG/L-CL	1

Replicate Analysis Sample Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	REP1	REP2	RPD	MAX RPD
G18558	02/25/91	NACDLB*4	403*I	PH,LAB	SU	5.39	5.32	1.31	20
G19137	02/28/91	NACDLB*1	70353*I	TOX	UG/L-CL	<10	<10	0.0	30
		NACDLB*4		TOX	UG/L-CL	<10	<10	0.0	30

Standard Matrix Spike Recovery Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	%R	%R CRIT
G19137	02/28/91	SP1*NONE*1	70353*I	TOX	UG/L-CL	100	70-130

Sample Matrix Spike Recovery Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	%R	%R CRIT	UNSPIKED
G19137	02/28/91	SPM*NACDLB*4	70353*I	TOX	UG/L-CL	96	70-130	ND

DATA SUMMARIES

pH, TOX, CONDUCTIVITY, HARDNESS, & TOC; ^{LDW1}~~NACDIB~~ *J*

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S		MW1
PARAMETERS	STORET	NACLDW1
UNITS	METHOD	
DATE		03/11/91
TIME		16:10
PH, LAB	403	5.05
STD UNITS	I	
SPECIFIC COND., LAB	95	789
UMHOS/CM	I	
TOX	70353	65
UG/L-CL	I	
HARDNESS	900	318
MG/L-CAC03	TITR	
CARBON, TOC	680	2.2
MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S		MW2
PARAMETERS	STORET	NACLDW1
UNITS	METHOD	
DATE		03/11/91
TIME		14:25
PH, LAB	403	4.19
STD UNITS	I	
SPECIFIC COND., LAB	95	552
UMHOS/CM	I	
TOX	70353	41
UG/L-CL	I	
HARDNESS	900	192
MG/L-CACO3	TITR	
CARBON, TOC	680	6.3
MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW3
PARAMETERS		STORET	NACLDW1
	UNITS	METHOD	
DATE			03/12/91
TIME			12:10
PH, LAB		403	6.10
	STD UNITS	I	
SPECIFIC COND., LAB		95	231
	UMHOS/CM	I	
TOX		70353	<10
	UG/L-CL	I	
HARDNESS		900	144
	MG/L-CACO3	TITR	
CARBON, TOC		680	1.8
	MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW4
PARAMETERS		STORET	NACLDW1
	UNITS	METHOD	
DATE			03/12/91
TIME			10:15
PH, LAB		403	6.32
	STD UNITS	I	
SPECIFIC COND., LAB		95	1300
	UMHOS/CM	I	
TOX		70353	42
	UG/L-CL	I	
HARDNESS		900	532
	MG/L-CACO3	TITR	
CARBON, TOC		680	4.6
	MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW5
PARAMETERS		STORET	NACLDW1
	UNITS	METHOD	
DATE			03/12/91
TIME			14:40
PH, LAB		403	6.13
	STD UNITS	I	
SPECIFIC COND., LAB		95	504
	UMHOS/CM	I	
TOX		70353	4100
	UG/L-CL	I	
HARDNESS		900	204
	MG/L-CACO3	TITR	
CARBON, TOC		680	4.3
	MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			MW6
PARAMETERS		STORET	NACLDW1
	UNITS	METHOD	
DATE			03/12/91
TIME			08:25
PH, LAB		403	6.11
	STD UNITS	I	
SPECIFIC COND., LAB		95	542
	UMHOS/CM	I	
TOX		70353	150
	UG/L-CL	I	
HARDNESS		900	291
	MG/L-CACO3	TITR	
CARBON, TOC		680	4.9
	MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S		FD#1
PARAMETERS	STORET	NACLDW1
UNITS	METHOD	
DATE		03/11/91
TIME		16:10
PH, LAB	403	4.18
STD UNITS	I	
SPECIFIC COND., LAB	95	740
UMHOS/CM	I	
TOX	70353	60
UG/L-CL	I	
HARDNESS	900	314
MG/L-CACO3	TITR	
CARBON, TOC	680	2.2
MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S PARAMETERS	UNITS	STORET METHOD	FLDBLK NACLDW1
DATE			03/12/91
TIME			15:05
PH, LAB		403	6.21
	STD UNITS	I	
SPECIFIC COND., LAB		95	<10.00
	UMHOS/CM	I	
TOX		70353	<10
	UG/L-CL	I	
HARDNESS		900	4.0
	MG/L-CACO3	TITR	
CARBON, TOC		680	1.1
	MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			EQPBLK
PARAMETERS		STORET	NACLDW1
	UNITS	METHOD	
DATE			03/11/91
TIME			16:30
PH, LAB		403	5.45
	STD UNITS	I	
SPECIFIC COND., LAB		95	<10.00
	UMHOS/CM	I	
TOX		70353	16
	UG/L-CL	I	
HARDNESS		900	2.0
	MG/L-CACO3	TITR	
CARBON, TOC		680	<1.0
	MG/L	I	

PROJECT NUMBER 3914022 0201
FIELD GROUP NACLDW1

PROJECT NAME NAVY - CD LANDFILL
LAB COORDINATOR J.D. SHAMIS

SAMPLE ID'S			EQPBLK
PARAMETERS		STORET	NACLDW1
	UNITS	METHOD	11
DATE			03/12/91
TIME			14:55
PH, LAB		403	5.83
	STD UNITS	I	
SPECIFIC COND., LAB		95	<10.00
	UMHOS/CM	I	
TOX		70353	<10
	UG/L-CL	I	
HARDNESS		900	4.0
	MG/L-CAC03	TITR	
CARBON, TOC		680	1.3
	MG/L	I	

QC SUMMARY FOR NACLDW1 FOR NON-CLP FORM ANALYTES

Method Blank Sample Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	FOUND
G18881	03/13/91	MB*NONE*1	403*I	PH,LAB	STD UNITS	6.35
G18883	03/12/91	MB*NONE*1		PH,LAB	STD UNITS	5.77
G18862	03/14/91	MB*NONE*1	95*I	SP COND.	UMHOS/CM	1.20
G18898	03/15/91	MB*NONE*1		SP COND.	UMHOS/CM	1.33
G19139	03/14/91	MB*NONE*1	70353*I	TOX	UG/L-CL	0.06
G19294	03/27/91	MB*NONE*1		TOX	UG/L-CL	ND
G19046	03/24/91	MB*NONE*1	900*TITR	HARDNESS	MG/L-CACO3	ND
G19398	04/08/91	MB*NONE*1	680*I	CARBON,TOC	MG/L	1.2

Replicate Analysis Sample Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	REP1	REP2	RPD
G18881	03/13/91	NACLDW1*3	403*I	PH,LAB	SU	6.10	6.12	0.33
G18883	03/12/91	NACLDW1*1		PH,LAB	SU	5.05	5.03	0.40
G18862	03/14/91	NACLDW1*8	95*I	SP COND	UMHOS/CM	740	742	0.270
G18898	03/15/91	NACLDW1*6		SP COND	UMHOS/CM	542	548	1.10
		NACLDW1*9		SP COND	UMHOS/CM	<10	<10	0.0

Standard Matrix Spike Recovery Summary

BATCH	DATE	SAMPLE	STORET	NAME	UNITS	%R	%R CRIT
G19139	03/14/91	SP1*NONE*1	70353*I	TOX	UG/L-CL	100	70-130
		SP2*NONE*1		TOX	UG/L-CL	110	70-130
G19294	03/27/91	SP1*NONE*1		TOX	UG/L-CL	100	70-130
G19046	03/24/91	SP1*NONE*1	900*TITR	HARDNESS	MG/L	102	85-115
		SP2*NONE*1		HARDNESS	MG/L	100	85-115
G19398	04/08/91	SP2*NONE*1	680*I	TOC	MG/L	87.0	85-115
		SP3*NONE*1		TOC	MG/L	88.7	85-115

Sample Matrix Spike Recovery Summary

BATCH	DATE	SAMPLE	STORET	NAME	%R	%R CRIT	UNSPIKED
G19294	03/27/91	SPM*NACLDW1*8	70353*I	TOX	110	70-130	60
		SPM2*NACLDW1*8		TOX	110	70-130	60
G19046	03/24/91	SPM1*NACLDW1*9	900*TITR	HARDNESS	100.0	85-115	4.0
		SPM2*NACLDW1*9		HARDNESS	99.0	85-115	4.0
G19398	04/08/91	SPM1*NACLDW1*8	680*I	TOC	108	85-115	2.2
		SPM2*NACLDW1*8		TOC	104	85-115	2.2

DATA SUMMARIES

METALS, NACLDW1*1-6,8-11

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Lab Name: ESE

Contract: NAVY

Lab Code: TOTALS

Case No.:

SAS No.:

SDG.No.:

SOW No. 7/88

EPA Sample No.

Lab Sample ID

EOPBLK

NACLDW1*10

EOPBLK

NACLDW1*11

FD#1

NACLDW1*8

FLDBLK

NACLDW1*9

MW1

NACLDW1*1

MW1S

SPM1*NACLDW1*1

MW1S

SPM2*NACLDW1*1

MW2

NACLDW1*2

MW2D

RP*NACLDW1*2

MW3

NACLDW1*3

MW4

NACLDW1*4

MW5

NACLDW1*5

MW6

NACLDW1*6

Were ICP interelement corrections applied?

Yes/No Y

Were ICP background corrections applied?

Yes/No Y

If yes, were raw data generated before
application of background corrections?

Yes/No

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature:

Name:

Date:

Title:

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Contract: NAVY

Case No.:

SAS No.:

SDG.No.:

SOW No. 7/88

Lab Sample ID
NACLDW1*10
NACLDW1*11
NACLDW1*8
NACLDW1*9
NACLDW1*1
SPM1*NACLDW1*1
SPM2*NACLDW1*1
NACLDW1*2
RP*NACLDW1*2
NACLDW1*3
NACLDW1*4
NACLDW1*5
NACLDW1*6

Were ICP interelement corrections applied?

Yes/No Y

Were ICP background corrections applied?

Yes/No Y

If yes, were raw data generated before application of background corrections?

Yes/No

Comments: _____

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

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Date: _____ Title: _____

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1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW1

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*1

Level (low/med):

Date Received: 03/12/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	28803.80			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	22696.52			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

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1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW1 - 0155

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLWDW1*1

Level (low/med):

Date Received: 03/12/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	23978.22			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

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1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW2

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLW1*2

Level (low/med):

Date Received: 03/12/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	23659.54			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	41670.85			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

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1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW2 - DISS

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*2

Level (low/med):

Date Received: 03/12/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	2285.66			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW3

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACL DW1*3

Level (low/med):

Date Received: 03/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	1458.28			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	9850.45			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW3 - DISS

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACL DW1*3

Level (low/med):

Date Received: 03/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	12.01	B		P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW4

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*4

Level (low/med):

Date Received: 03/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	6010.69			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	129807.18			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW4 -D155

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*4

Level (low/med):

Date Received: 03/13/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	585.33			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW5

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*5

Level (low/med):

Date Received: 03/13/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	38128.60			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	28441.71			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW5 -0155

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*5

Level (low/med):

Date Received: 03/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	31651.26			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW6

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*6

Level (low/med):

Date Received: 03/13/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	17470.32			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	20530.04			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW6 -0155

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*6

Level (low/med):

Date Received: 03/13/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	12315.56			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

FD#1

(cf MWI)

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*8

Level (low/med):

Date Received: 03/12/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	27362.89			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	22044.14			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

FD#1 - DISS
(of MW-1)

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*8

Level (low/med):

Date Received: 03/12/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	22605.60			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

FLDBLK

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*9

Level (low/med):

Date Received: 03/13/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	27.82	B		P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	271.18	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

FLDBLK-0155

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*9

Level (low/med):

Date Received: 03/13/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	27.55	B		P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

EQPBLK

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*10

Level (low/med):

Date Received: 03/12/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	57.99	B		P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	200.01	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

EQPBLK-DISS

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*10

Level (low/med):

Date Received: 03/12/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	12.00	U		P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

EQPBLK

Lab Name: ESE

Contract: NAVY

Lab Code: WATERS

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*11

Level (low/med):

Date Received: 03/13/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	215.83			P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	174.89	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

EQPBLK - 0155

Lab Name: ESE

Contract: NAVY

Lab Code: DISS.W

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLWDW1*11

Level (low/med):

Date Received: 03/13/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	18.06	B		P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: ICV,CCV

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			True	Continuing Calibration			%R(1)	M
	True	Found	%R(1)		Found	%R(1)	Found		
Aluminum									
Antimony	1000.0	1020.18	102.0	500.0	527.62	105.5	515.65	103.1	P
Arsenic									
Barium									
Beryllium	1000.0	1032.00	103.2	500.0	517.27	103.5	519.45	103.9	P
Cadmium	1000.0	1005.75	100.6	500.0	509.84	102.0	510.95	102.2	P
Calcium									
Chromium	1000.0	1040.66	104.1	500.0	508.94	101.8	511.83	102.4	P
Cobalt									
Copper	1000.0	1023.13	102.3	500.0	511.16	102.2	512.88	102.6	P
Iron	1000.0	1049.25	104.9	5000.0	5148.28	103.0	5194.97	103.9	P
Lead	1000.0	1059.59	106.0	500.0	543.32	108.7	518.39	103.7	P
Magnesium									
Manganese									
Mercury									
Nickel	1000.0	1026.14	102.6	500.0	500.18	100.0	504.02	100.8	P
Potassium									
Selenium									
Silver	1000.0	1003.46	100.3	500.0	504.68	100.9	510.33	102.1	P
Sodium	1000.0	1058.23	105.8	5000.0	5068.14	101.4	5147.68	103.0	P
Thallium	1000.0	1068.87	106.9	700.0	735.53	105.1	749.15	107.0	P
Vanadium									
Zinc	1000.0	1016.46	101.6	500.0	505.74	101.1	511.25	102.2	P
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: CCV

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

(DISS)
78

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony				500.0	523.94	104.8	511.61	102.3	P
Arsenic									
Barium									
Beryllium				500.0	512.88	102.6	521.68	104.3	P
Cadmium				500.0	510.95	102.2	510.67	102.1	P
Calcium									
Chromium				500.0	502.32	100.5	504.19	100.8	P
Cobalt									
Copper				500.0	508.09	101.6	500.71	100.1	P
Iron				5000.0	5134.48	102.7	5064.41	101.3	P
Lead				500.0	505.11	101.0	509.01	101.8	P
Magnesium									
Manganese									
Mercury									
Nickel				500.0	504.02	100.8	496.34	99.3	P
Potassium									
Selenium									
Silver				500.0	509.65	101.9	508.98	101.8	P
Sodium				5000.0	5073.72	101.5	4973.95	99.5	P
Thallium				700.0	698.38	99.8	684.83	97.8	P
Vanadium									
Zinc				500.0	507.68	101.5	503.87	100.8	P
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: CCV

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony				500.0	520.05	104.0	522.80	104.6	P
Arsenic									
Barium									
Beryllium				500.0	523.86	104.8	515.09	103.0	P
Cadmium				500.0	516.53	103.3	507.89	101.6	P
Calcium									
Chromium				500.0	513.17	102.6	503.41	100.7	P
Cobalt									
Copper				500.0	515.71	103.1	496.29	99.3	P
Iron				5000.0	5138.42	102.8	5039.95	100.8	P
Lead				500.0	497.21	99.4	516.82	103.4	P
Magnesium									
Manganese									
Mercury									
Nickel				500.0	508.95	101.8	499.08	99.8	P
Potassium									
Selenium									
Silver				500.0	511.91	102.4	504.01	100.8	P
Sodium				5000.0	5168.62	103.4	4948.83	99.0	P
Thallium				700.0	707.50	101.1	703.63	100.5	P
Vanadium									
Zinc				500.0	507.35	101.5	503.33	100.7	P
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

3
BLANKS

Lab Name: ESE

Contract: NAVY

Lab Code: ICB,CCB,MB

Case No.:

SAS No.:

SDG.No.:

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			1	C	2	C	3	C			
Aluminum											
Antimony	40.0	U	40.0	U	40.0	U	40.0	U	40.0	U	P
Arsenic											
Barium											
Beryllium	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	P
Cadmium	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	P
Calcium											
Chromium	5.7	U	5.7	U	5.7	U	5.7	U	5.7	U	P
Cobalt											
Copper	5.8	U	5.8	U	5.8	U	5.8	U	5.8	U	P
Iron	12.0	U	12.0	U	12.0	U	12.0	U	12.0	U	P
Lead	47.0	U	47.0	U	47.0	U	47.0	U	47.0	U	P
Magnesium											
Manganese											
Mercury											
Nickel	14.0	U	14.0	U	14.0	U	14.0	U	14.0	U	P
Potassium											
Selenium											
Silver	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	P
Sodium	59.7	U	59.7	U	59.7	U	59.7	U	61.860	B	P
Thallium	176.0	U	176.0	U	176.0	U	176.0	U	176.0	U	P
Vanadium											
Zinc	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	P
Cyanide											

U.S. EPA - CLP

3
BLANKS

Lab Name: ESE

Contract: NAVY

Lab Code: CCB,MB

Case No.:

SAS No.:

SDG.No.:

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			1	C	2	C	3	C			
Aluminum											
Antimony			40.0	U	40.0	U			40.0	U	P
Arsenic											
Barium											
Beryllium			1.3	U	1.3	U			1.3	U	P
Cadmium			3.0	U	3.0	U			3.0	U	P
Calcium											
Chromium			5.7	U	5.7	U			5.7	U	P
Cobalt											
Copper			5.8	U	5.8	U			5.8	U	P
Iron			12.0	U	12.0	U			12.0	U	P
Lead			47.0	U	47.0	U			47.0	U	P
Magnesium											
Manganese											
Mercury											
Nickel			14.0	U	14.0	U			14.0	U	P
Potassium											
Selenium											
Silver			4.9	U	4.9	U			4.9	U	P
Sodium			59.7	U	59.7	U			123.960	B	P
Thallium			176.0	U	176.0	U			176.0	U	P
Vanadium											
Zinc			5.6	U	5.6	U			8.580	B	P
Cyanide											

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: ICS

Case No.:

SAS No.:

SDG.No.:

ICP ID Number: JA1100CLP

ICS Source:

Concentration Units: UG/L

Analyte	True		Initial Found			Final Found		
	Sol. A	Sol. AB	Sol. A	Sol. AB	%R	Sol. A	Sol. AB	%R
Aluminum								
Antimony		1000		1006.2	100.6		996.7	99.7
Arsenic								
Barium								
Beryllium		500		514.4	102.9		516.6	103.3
Cadmium		1000		972.0	97.2		968.4	96.8
Calcium								
Chromium		1000		1023.5	102.4		1034.8	103.5
Cobalt								
Copper		500		495.4	99.1		499.1	99.8
Iron		20000		19615.5	98.1		19608.9	98.0
Lead		5000		4924.1	98.5		4628.6	92.6
Magnesium								
Manganese								
Mercury								
Nickel		1000		953.2	95.3		968.6	96.9
Potassium								
Selenium								
Silver		500		484.4	96.9		482.3	96.5
Sodium		50000		48499.6	97.0		48938.5	97.9
Thallium		1000		1013.3	101.3		987.0	98.7
Vanadium								
Zinc		1000		980.5	98.0		982.4	98.2

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5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

MWIS (MS)

Lab Code: SPM1

Case No.:

SAS No.:

SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									P
Arsenic									
Barium									
Beryllium									P
Cadmium	75-125	50.7000		3.0000	U	50.00	101.4		P
Calcium									
Chromium									P
Cobalt									
Copper									P
Iron		30878.7300		28803.8000		1000.00	207.5		P
Lead	75-125	527.5000		47.0000	U	500.00	105.5		P
Magnesium									
Manganese									
Mercury									
Nickel									P
Potassium									
Selenium									
Silver									P
Sodium	75-125	33889.6600		22696.5200		10000.00	111.9		P
Thallium									P
Vanadium									
Zinc									P
Cyanide									

Comments:

U.S. EPA - CLP

5A

SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

MWIS

(MS-
0155)

Lab Code: SPM1 DISS.

Case No.:

SAS No.:

SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium	75-125	49.3100		3.0000	U	50.00	98.6		P
Calcium									
Chromium									
Cobalt									
Copper									
Iron		25347.4800		23978.2200		1000.00	136.9		P
Lead	75-125	483.8000		47.0000	U	500.00	96.8		P
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

Comments:

U.S. EPA - CLP

5A

SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

MWIS

(MS/D)

Lab Code: SPM2

Case No.:

SAS No.:

SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									P
Arsenic									
Barium									
Beryllium									P
Cadmium	75-125	51.8200		3.0000	U	50.00	103.6		P
Calcium									
Chromium									P
Cobalt									
Copper									P
Iron		31008.3800		28803.8000		1000.00	220.5		P
Lead	75-125	547.6100		47.0000	U	500.00	109.5		P
Magnesium									
Manganese									
Mercury									
Nickel									P
Potassium									
Selenium									
Silver									P
Sodium	75-125	33612.6600		22696.5200		10000.00	109.2		P
Thallium									P
Vanadium									
Zinc									P
Cyanide									

Comments:

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

MWIS

(MS-D
DISS)

Lab Code: SPM2 DISS.

Case No.:

SAS No.:

SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium	75-125	49.0300		3.0000	U	50.00	98.1		P
Calcium									
Chromium									
Cobalt									
Copper									
Iron		25338.4700		23978.2200		1000.00	136.0		P
Lead	75-125	470.4300		47.0000	U	500.00	94.1		P
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

MW2D

(RP)

Lab Name: ESE

Contract: NAVY

Lab Code: RP

Case No.:

SAS No.:

SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								P
Arsenic								
Barium								
Beryllium								P
Cadmium		3.0000	U	3.0000	U			P
Calcium								
Chromium								P
Cobalt								
Copper								P
Iron		23659.5400		23762.7100		0.4		P
Lead		47.0000	U	47.0000	U			P
Magnesium								
Manganese								
Mercury								
Nickel								P
Potassium								
Selenium								
Silver								P
Sodium		41670.8500		40633.3100		2.5		P
Thallium								P
Vanadium								
Zinc								P
Cyanide								

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6
DUPLICATES

EPA SAMPLE NO.

MW2D-DISS
(RP)

Lab Name: ESE

Contract: NAVY

Lab Code: RP DISS.

Case No.:

SAS No.:

SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium		3.0000	U	3.0000	U			P
Calcium								
Chromium								
Cobalt								
Copper								
Iron		2285.6600		2295.1600		0.4		P
Lead		47.0000	U	47.0000	U			P
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide								

FORM VI - IN

7/88

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: SP1

Case No.:

SAS No.:

SDG.No.:

Solid LCS Source:

Aqueous LCS Source:

Analyte	Aqueous (ug/L)			Solid (mg/kg)				%R
	True	Found	%R	True	Found	C	Limits	
Aluminum								
Antimony	500.0	506.95	101.4					
Arsenic								
Barium								
Beryllium	50.0	50.30	100.6					
Cadmium	50.0	48.19	96.4					
Calcium								
Chromium	200.0	203.00	101.5					
Cobalt								
Copper	250.0	250.26	100.1					
Iron	1000.0	1032.12	103.2					
Lead	500.0	504.76	101.0					
Magnesium								
Manganese								
Mercury								
Nickel	400.0	395.42	98.9					
Potassium								
Selenium								
Silver	50.0	50.57	101.1					
Sodium	10000.0	10430.97	104.3					
Thallium	1000.0	1003.14	100.3					
Vanadium								
Zinc	200.0	212.54	106.3					
Cyanide								

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7

LABORATORY CONTROL SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: SP2

Case No.:

SAS No.:

SDG.No.:

Solid LCS Source:

Aqueous LCS Source:

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Aluminum								
Antimony	500.0	513.81	102.8					
Arsenic								
Barium								
Beryllium	50.0	50.30	100.6					
Cadmium	50.0	48.75	97.5					
Calcium								
Chromium	200.0	203.79	101.9					
Cobalt								
Copper	250.0	245.84	98.3					
Iron	1000.0	1024.08	102.4					
Lead	500.0	525.19	105.0					
Magnesium								
Manganese								
Mercury								
Nickel	400.0	394.88	98.7					
Potassium								
Selenium								
Silver	50.0	51.02	102.0					
Sodium	10000.0	10083.49	100.8					
Thallium	1000.0	998.63	99.9					
Vanadium								
Zinc	200.0	207.03	103.5					
Cyanide								

DATA SUMMARIES

METALS,

NACDLB*1,4 & NACLDW1*14-16

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COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: ESE

Contract: NAVY

Lab Code: DA

Case No.:

SAS No.:

SDG.No.: NACDLB

SOW No. 7/88

+ NACLDW1

EPA Sample No.

Lab Sample ID

~~EOPBLK~~

~~NALPB1*2~~

~~EOPBLK~~

~~NALPB1*3~~

~~EOPBLK~~

~~NALPB1*9~~

~~EOPBLK~~

~~NACDLB*4~~

~~EOPBLKD~~

~~RP*NALPB1*2~~

~~FLDBLK~~

~~NALPB1*1~~

~~FLDBLK~~

~~NACDLB*1~~

~~FLDBLKs~~

~~SPM1*NALPB1*1~~

~~FLDBLKs~~

~~SPM2*NALPB1*1~~

~~POTABL~~

~~NALPB1*8~~

SW2

NACLDW1*14

SW3

NACLDW1*15

SW4

NACLDW1*16

Were ICP interelement corrections applied?

Yes/No Y

Were ICP background corrections applied?

Yes/No Y

If yes, were raw data generated before application of background corrections?

Yes/No N

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____

Name: _____

Date: _____

Title: _____

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1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

FLDBLK

Lab Name: ESE

Contract: NAVY

Lab Code: DA

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACDLB*1

Level (low/med):

Date Received: 02/25/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	45.00	B	*	P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

EQPBLK

Lab Name: ESE

Contract: NAVY

Lab Code: DA

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACDLB*4

Level (low/med):

Date Received: 02/25/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	108.38		*	P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SW2

Lab Name: ESE

Contract: NAVY

Lab Code: DA

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*14

Level (low/med):

Date Received: 02/21/91

% Solids:

0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	250.44		*	P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	27,150.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SW3

Lab Name: ESE

Contract: NAVY

Lab Code: DA

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*15

Level (low/med):

Date Received: 02/21/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	4329.99	*		P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	54,300.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

SW4

Lab Name: ESE

Contract: NAVY

Lab Code: DA

Case No.:

SAS No.:

SDG No.:

Matrix (soil/water): WATER

Lab Sample ID: NACLDW1*16

Level (low/med):

Date Received: 02/21/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium	3.00	U		P
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	2898.00		*	P
7439-92-1	Lead	47.00	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	41,890.00			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: ICV,CCV

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony	1000.0	989.89	99.0	500.0	506.68	101.3	517.48	103.5	P
Arsenic	50.0	54.40	108.8	50.0	51.20	102.4	51.10	102.2	F
Barium									
Beryllium	1000.0	1007.20	100.7	500.0	512.74	102.5	504.60	100.9	P
Cadmium	1000.0	990.43	99.0	500.0	512.60	102.5	503.49	100.7	P
Calcium									
Chromium	1000.0	1025.94	102.6	500.0	509.78	102.0	500.44	100.1	P
Cobalt									
Copper	1000.0	997.86	99.8	500.0	510.73	102.1	494.06	98.8	P
Iron	1000.0	1031.40	103.1	5000.0	5089.02	101.8	5015.72	100.3	P
Lead	1000.0	1023.42	102.3	500.0	497.96	99.6	501.68	100.3	P
Magnesium									
Manganese									
Mercury	5.0	4.92	98.4	5.0	4.75	95.0			CV
Nickel	1000.0	1015.88	101.6	500.0	507.85	101.6	506.38	101.3	P
Potassium									
Selenium	124.0	124.50	100.4	50.0	48.60	97.2	50.50	101.0	F
Silver	1000.0	1025.35	102.5	500.0	517.29	103.5	508.47	101.7	P
Sodium	1000.0	1067.00	106.7	5000.0	5210.00	104.2	4920.00	98.4	P
Thallium	1000.0	1050.11	105.0	700.0	713.78	102.0	687.89	98.3	P
Vanadium									
Zinc	1000.0	992.35	99.2	500.0	509.23	101.8	494.12	98.8	P
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: AA/PB W

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead	50.0	51.80	103.6	50.0	52.20	0.0	50.30	100.6	F
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: ICV,CCV

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									
Antimony				500.0	502.90	100.6			P
Arsenic				50.0	48.40	96.8			F
Barium									
Beryllium				500.0	517.40	103.5			P
Cadmium				500.0	512.37	102.5			P
Calcium									
Chromium				500.0	510.45	102.1			P
Cobalt									
Copper				500.0	507.97	101.6			P
Iron				5000.0	5097.26	101.9			P
Lead				500.0	492.47	98.5			P
Magnesium									
Manganese									
Mercury				10.0	9.82	98.2			CV
Nickel				500.0	520.32	104.1			P
Potassium									
Selenium				50.0	50.30	100.6			F
Silver				500.0	520.45	104.1			P
Sodium				5000.0	5090.00	101.8			P
Thallium				700.0	746.77	106.7			P
Vanadium									
Zinc				500.0	504.72	100.9			P
Cyanide									

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ESE

Contract: NAVY

Lab Code: AA/PB W

Case No.:

SAS No.:

SDG.No.:

Initial Calibration Source:

Continuing Calibration Source:

Concentration Units: UG/L

Analyte	Initial Calibration			True	Continuing Calibration			Found	%R(1)	M
	True	Found	%R(1)		Found	%R(1)	Found			
Aluminum										
Antimony										
Arsenic										
Barium										
Beryllium										
Cadmium										
Calcium										
Chromium										
Cobalt										
Copper										
Iron										
Lead				50.0	50.30	100.6				F
Magnesium										
Manganese										
Mercury										
Nickel										
Potassium										
Selenium										
Silver										
Sodium										
Thallium										
Vanadium										
Zinc										
Cyanide										

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

3
BLANKS

Lab Name: ESE

Contract: NAVY

Lab Code: ICB,CCB

Case No.:

SAS No.:

SDG.No.:

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			1	C	2	C	3	C			
Aluminum											
Antimony	40.0	U	40.0	U	40.0	U			40.0	U	P
Arsenic	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	F
Barium											
Beryllium	1.3	U	1.3	U	1.3	U			1.3	U	P
Cadmium	3.0	U	3.0	U	3.0	U			3.0	U	P
Calcium											
Chromium	5.7	U	5.7	U	5.7	U			5.7	U	P
Cobalt											
Copper	5.8	U	5.8	U	5.8	U			5.8	U	P
Iron	12.0	U	12.0	U	12.0	U			12.0	U	P
Lead	47.0	U	47.0	U	47.0	U			47.0	U	P
Magnesium											
Manganese											
Mercury			0.2	U					0.2	U	CV
Nickel	14.0	U	14.0	U	14.0	U			14.0	U	P
Potassium											
Selenium	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	F
Silver	4.9	U	4.9	U	4.9	U			4.9	U	P
Sodium	60.0	U	60.0	U	60.0	U			60.0	U	P
Thallium	176.0	U	176.0	U	176.0	U			176.0	U	P
Vanadium											
Zinc	5.6	U	5.6	U	5.6	U			5.640	B	P
Cyanide											

U.S. EPA - CLP

3
BLANKS

Lab Name: ESE

Contract: NAVY

Lab Code: AA/PB W

Case No.:

SAS No.:

SDG.No.:

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						C	Prepa- ration Blank	C	M
			1	C	2	C	3					
Aluminum												
Antimony												
Arsenic												
Barium												
Beryllium												
Cadmium												
Calcium												
Chromium												
Cobalt												
Copper												
Iron												
Lead	2.0	U	2.0	U	2.0	U				2.0	U	F
Magnesium												
Manganese												
Mercury												
Nickel												
Potassium												
Selenium												
Silver												
Sodium												
Thallium												
Vanadium												
Zinc												
Cyanide												

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: ICS

Case No.:

SAS No.:

SDG.No.:

ICP ID Number: JA1100CLP

ICS Source: ESE

Concentration Units: UG/L

Analyte	True		Initial Found			Final Found		
	Sol. A	Sol. AB	Sol. A	Sol. AB	%R	Sol. A	Sol. AB	%R
Aluminum								
Antimony		1000		1020.2	102.0		1030.9	103.1
Arsenic								
Barium								
Beryllium		500		517.3	103.5		532.4	106.5
Cadmium		1000		1000.9	100.1		1033.7	103.4
Calcium								
Chromium		1000		1038.1	103.8		1065.1	106.5
Cobalt								
Copper		500		491.1	98.2		494.9	99.0
Iron		20000		19651.8	98.3		19954.2	99.8
Lead		5000		5211.3	104.2		5323.6	106.5
Magnesium								
Manganese								
Mercury								
Nickel		1000		976.6	97.7		1007.4	100.7
Potassium								
Selenium								
Silver		500		505.1	101.0		516.2	103.2
Sodium		50000		48290.0	96.6		49020	98.0
Thallium		1000		992.4	99.2		1066.5	106.6
Vanadium								
Zinc		1000		999.7	100.0		1017.0	101.7

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

FLDBLKS

Lab Code: SPM1

Case No.:

SAS No.:

NALPB1*1
SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony	75-125	506.5200		40.0000	U	500.00	101.3		P
Arsenic	75-125	22.3000		2.6000	U	20.00	111.5		F
Barium									
Beryllium	75-125	49.9100		1.3000	U	50.00	99.8		P
Cadmium	75-125	52.5300		3.0000	U	50.00	105.1		P
Calcium									
Chromium	75-125	209.1600		5.7000	U	200.00	104.6		P
Cobalt									
Copper	75-125	251.3400		5.8000	U	250.00	100.5		P
Iron	75-125	1014.7300		12.0000	U	1000.00	101.5		P
Lead	75-125	540.6800		47.0000	U	500.00	108.1		P
Magnesium									
Manganese									
Mercury	75-125	4.8349		0.2	U	5.00	96.7		CV
Nickel	75-125	397.8200		14.0000	U	400.00	99.5		P
Potassium									
Selenium	75-125	22.4000		2.1000	U	20.00	112.0		F
Silver	75-125	47.9000		4.9000	U	50.00	95.8		P
Sodium	75-125	10190.0000		242.4000		10.000	99.5		P
Thallium									
Vanadium									
Zinc	75-125	211.5300		8.8300	B	200.00	101.4		P
Cyanide									

Comments:

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

FLDBLKS (MS)

Lab Code: AA/PB W

Case No.:

SAS No.:

NAALPB1*1
SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead	75-125	23.0000		2.2000	B	20.00	104.0		F
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

Comments:

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

FLDBLKS

(MS/D)

Lab Code: SPM2

Case No.:

SAS No.:

NALPBI*
SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony	75-125	493.0900		40.0000	U	500.00	98.6		P
Arsenic	75-125	22.3000		2.6000	U	20.00	111.5		F
Barium									
Beryllium	75-125	49.9100		1.3000	U	50.00	99.8		P
Cadmium	75-125	51.6200		3.0000	U	50.00	103.2		P
Calcium									
Chromium	75-125	208.6500		5.7000	U	200.00	104.3		P
Cobalt									
Copper	75-125	253.5900		5.8000	U	250.00	101.4		P
Iron	75-125	1014.1600		12.0000	U	1000.00	101.4		P
Lead	75-125	491.7700		47.0000	U	500.00	98.4		P
Magnesium									
Manganese									
Mercury	75-125	4.9217		0.2	U	5.00	98.4		CV
Nickel	75-125	394.5200		14.0000	U	400.00	98.6		P
Potassium									
Selenium	75-125	22.5000		2.1000	U	20.00	112.5		F
Silver	75-125	47.0600		4.9000	U	50.00	94.1		P
Sodium	75-125	10330.0000		242.4000		10,000	100.9		P
Thallium									
Vanadium									
Zinc	75-125	208.7400		8.8300	B	200.00	100.0		P
Cyanide									

Comments:

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

FLDBLKS

(MS/D)

Lab Code: AA/PB W

Case No.:

SAS No.:

NAZPB1*1
SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead	75-125	19.8000		2.2000	B	20.00	88.0		F
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

EQPBLKD
NALPBI*2-RP

Lab Code: RP

Case No.:

SAS No.:

SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony		40.0000	U	40.0000	U			P
Arsenic		2.6000	U	2.6000	U			F
Barium								
Beryllium		1.3000	U	1.3000	U			P
Cadmium		3.0000	U	3.0000	U			P
Calcium								
Chromium		5.7000	U	5.7000	U			P
Cobalt								
Copper		5.8000	U	5.8000	U			P
Iron	100	222.6700		402.6700		57.6	*	P
Lead		47.0000	U	47.0000	U			P
Magnesium								
Manganese								
Mercury		0.2	U	0.2	U			CV
Nickel		14.0000	U	14.0000	U			P
Potassium								
Selenium		2.1000	U	2.1000	U			F
Silver		4.9000	U	4.9000	U			P
Sodium	±5000	323.2000		327.6000		1.4		P
Thallium		176.0000	U	176.0000	U			P
Vanadium								
Zinc		8.8800	B	6.9200	B	24.8		P
Cyanide								

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6
DUPLICATES

EPA SAMPLE NO.

Lab Name: ESE

Contract: NAVY

EQPBLKD

RP

Lab Code: AA/PB W

Case No.:

SAS No.:

NALPB1*2
SDG.No.:

Matrix (soil/water): WATER

Level (low/med):

% Solids for Sample: 0.0

% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead	3	2.0000	U	3.8000		200.0	*	F
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide								

FORM VI - IN

7/88

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: SP1

Case No.:

SAS No.:

SDG.No.:

Solid LCS Source:

Aqueous LCS Source:

Analyte	Aqueous (ug/L)			Solid (mg/kg)				%R
	True	Found	%R	True	Found	C	Limits	
Aluminum								
Antimony	500.0	483.53	96.7					
Arsenic	20.0	22.10	110.5					
Barium								
Beryllium	50.0	48.74	97.5					
Cadmium	50.0	46.38	92.8					
Calcium								
Chromium	200.0	205.07	102.5					
Cobalt								
Copper	250.0	247.55	99.0					
Iron	1000.0	1045.19	104.5					
Lead	500.0	497.20	99.4					
Magnesium								
Manganese								
Mercury	5.0	5.27	105.4					
Nickel	400.0	389.75	97.4					
Potassium								
Selenium	20.0	22.50	112.5					
Silver	50.0	42.86	85.7					
Sodium	10000.0	10120.00	101.2					
Thallium								
Vanadium								
Zinc	200.0	211.02	105.5					
Cyanide								

FORM VII - IN

7/88

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: ESE

Contract: NAVY

Lab Code: AA/PB W

Case No.:

SAS No.:

SDG.No.:

Solid LCS Source:

Aqueous LCS Source:

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead	20.0	19.40	97.0					
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide								